THE METAL INDUSTRY
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MODERN PLATING PRACTICE

A Piecework System as Used by the National Cash Register Company.

By W. Fraine.*

One of the chief difficulties in installing a piecework system in the average plating department is the number and variety of jobs which the operator has in work at the same time, and the apparent difficulty of finding the exact length of time that should be charged against each one. Another difficulty is that oftentimes it is necessary for two or more men to work on the same job of work in order to utilize tank space or to turn out a particular job in a short time. These two or more men may have different rates of pay, and if the piecework price should be set on the basis of the rate of highest pay, the man with the lowest rate would be overpaid in proportion to his rate; and if the price is set on the basis of the lowest rated man, the highest rated man would not receive as much as he should. That these difficulties are more apparent than real may be seen by a study of the piecework system as worked and applied to the plating department of The National Cash Register Company, of Dayton, Ohio. The system has been in use for a number of years and has proved highly satisfactory to all concerned.

VIEW OF PLATING DEPARTMENT AT THE PLANT OF THE NATIONAL CASH REGISTER COMPANY, DAYTON, OHIO.

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The number of employees in the department when running full is about 125. There are several different rates of pay on day basis. These rates are set as a basis of proportioning the piecework earnings among the men in the gang. These rates are arbitrary, and certain increases in the day rates are made after certain definite periods of service. These increases are also arbitrary, and the employee knows definitely when he may expect an increase in his day rate. Some of these men are in-

FILE CARD SYSTEM, OPERATION AND PIECE CARDS.

dividual pieceworkers, but most of them are assembled in groups or gangs and piecework prices are set on both bases, the method being the same in either case.

METHOD OF SETTING PIECE RATES.

The first step in setting a piecework rate is to determine what is a fair hourly rate for the class of labor and skill required to do a particular class of work. This be-

AB 69.254

Name 500 Auto Hood B.

Operation Name	Operation Number	Next Dept. and Operation	Price	Date	Price.	Date
Dip	66	4W 8	087	4-29 14		
Rin	34	32	67	1-24 14		
Rm Buff	32	59	092	4-29 14		
Wash	59	16 B	05	3-30 14		

Operation and price card.

AN OPERATION AND PRICE CARD.

ing determined, it becomes the basis for setting piecework prices for that particular class of work. For instance, if the amount of skill and experience required to do a certain operation or series of operations justifies paying a man or a gang of men a rate of 35 cents per hour, the piecework hourly rate would be set on that basis and the piecework price is figured so that that rate will be the minimum average wage the individual or the gang will earn per hour.

METHOD OF SETTING PIECEWORK PRICES.

Under the old system of setting piecework prices in most factories, and still in use in some at the present time, the method was to set a price from records of previous performance or for the foreman or job foreman to time a man on a job, or at most for one of them to work for awhile at a given job and set a price by the result. Many prices were set by comparison and many by guesswork. All of these methods were unscientific and the results were unfair both to the employer and the employee.

The modern method is to standardize processes and operations and to have all operations tried out by one or more men who are skilled in the various operations and are able to handle each with reasonable rapidity. It is not the idea to speed the workmen up to the limit of their ability, but rather to set a fair standard of output governed by the conditions under which the work is to be done. In order to create confidence that prices will not be reduced in case the workmen exceed the hourly rate set (by reason of extra effort or ability), The National Cash Register Company rules that "every piecework price set is guaranteed for one year, unless there are changes in methods, equipment or stock that would cause a difference in labor costs either up or down." In order that the tryout man may get an accurate cost of

SHOWING METHOD OF DELIVERING WORK TO AND FROM THE PLATING DEPARTMENT.

the labor involved in plating any given piece of work, it is necessary to separate each step of the process and to make a time study of each. This is particularly necessary in a plating room, as the operations are not continuous and the workman or gang may have a dozen or more different jobs of work running at one time.

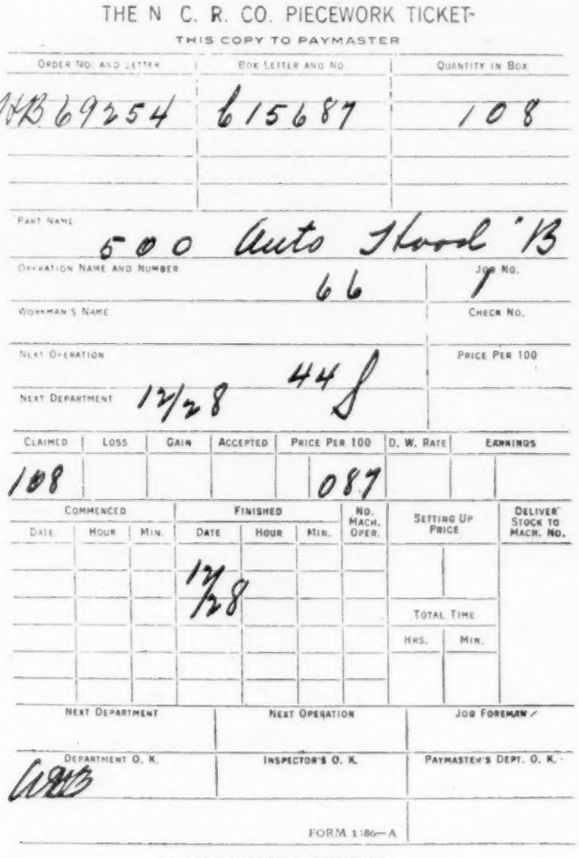
A TRYOUT ILLUSTRATION.

A typical example of a tryout is as follows: The tryout man, being given a certain lot of work to try out, which in this case we will assume is a polished steel part, 5,000 pieces to the lot, he would note the time when he is ready to start, transfer the work from the rack on which it is received to the potash tank, making a record of the time consumed, say, 10 minutes Now, as the work will require a few minutes' immersion to saponify the grease and loosen the dirt, he cuts off his time until ready for the next step. When the work is ready to be transferred to the electric cleaning tank he again makes note of the time and starts to transfer, throwing on the current when he hangs in the first bunch of work. Time required to transfer, 12 minutes. Remove from cleaner, run through pickle, rinse in water, cyanide dip and again

rinse, 22 minutes; hang in plating tank, 65 minutes. As no labor will be spent on the work while plating, he cuts off his time again until ready to remove the work from the plating tank. When ready he notes the time, removes work from tank, rinses in cold and hot water, dries out in sawdust and hangs work on rack finished; time, eight minutes; total time, 117 minutes. 117 minutes at an hourly rate of 35 cents per hour = $0.682. 5.000) 0.682 (.0132 per 100.

METHOD OF SETTING PIECE RATES ON GANG WORK.

When two or more men are working on the same lot of work and the price paid for the amount of work done is to be divided among them, the problem is how to find an equitable rate upon which to figure prices, especially


THE N C. R. CO. PIECEWORK TICKET-

THIS COPY TO PAYMASTER

ORDER NO. AND LETTER	BOX LETTER AND NO.	QUANTITY IN BOX
NB 69254	615687	108

PART NAME: 500 Auto Hood '13

OPERATION NAME AND NUMBER: 66 — JOB NO.: 1

WORKMAN'S NAME — CHECK NO.

NEXT OPERATION: 44 S — PRICE PER 100

NEXT DEPARTMENT: 12/28

CLAIMED	LOSS	GAIN	ACCEPTED	PRICE PER 100	D. W. RATE	EARNINGS
108				087		

COMMENCED DATE	COMMENCED HOUR	COMMENCED MIN.	FINISHED DATE	FINISHED HOUR	FINISHED MIN.	NO. MACH. OPER.	SETTING UP PRICE	DELIVER STOCK TO MACH. NO.
			12/28					

TOTAL TIME: HRS. — MIN.

NEXT DEPARTMENT — NEXT OPERATION — JOB FOREMAN

DEPARTMENT O. K.: WHB — INSPECTOR'S O. K. — PAYMASTER'S DEPT. O. K.

FORM 1186—A

A PIECEWORK TICKET.

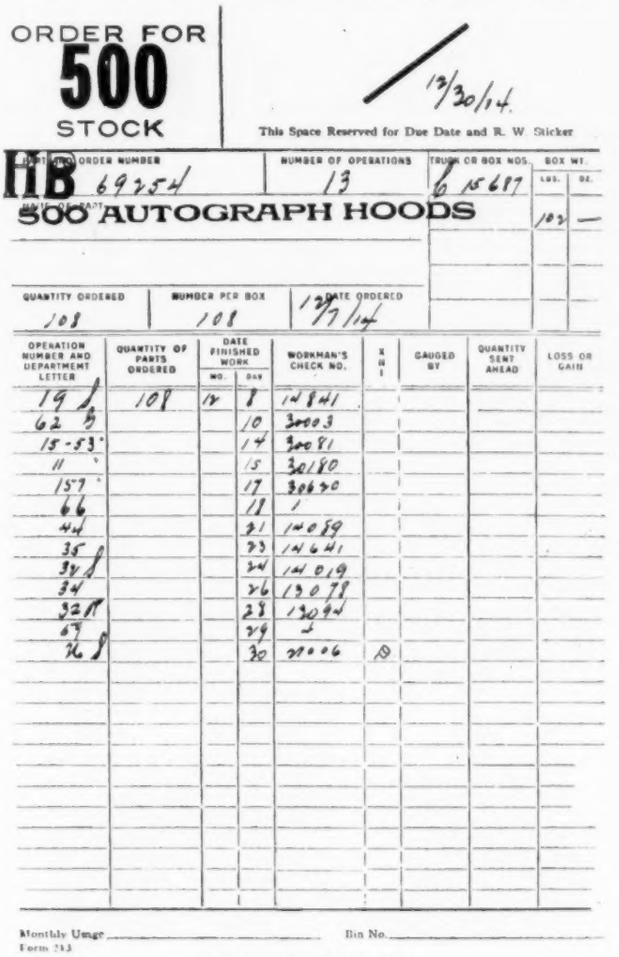
if the workmen are paid different hourly rates. If the men were all receiving the same rate per hour, the problem would be as easy as that of the individual pieceworker, and the number employed on the gang would be the unit instead of the individual. But as conditions may require that the gang be formed with a number of men having different hourly rates of pay, and it is desired that each shall share in the piecework earnings in proportion to his rate of pay, it would appear a rather complicated problem.

In practice it works out like this: Suppose that it is desired to change from a day work to a piece work basis, and the change will affect ten men with three different hourly rates of pay, say 20, 22.5 and 25 cents per hour, who are to be formed into a unit of production. A job rate would be set on which to figure piecework prices and that job rate would be an average of the combined hourly day rate, and would become the hourly job piece rate.

Viz.: Five men at 25c. per hour.....	$1.25
Three men at 22.5c. per hour.....	.675
Two men at 20c. per hour.....	.40
	$2.325

total job earnings per hour day work. This sum, divided by the number of men in the gang (10), gives $0.2325, which becomes the hourly job piece rate.

If it is the intention to set prices on the basis of present earnings, without any premium for the extra effort which is the usual result of a satisfactory piecework, bonus or premium system, all prices would be


ORDER FOR 500 STOCK

12/30/14.

This Space Reserved for Due Date and R. W. Sticker

PART NO.	ORDER NUMBER	NUMBER OF OPERATIONS	TRUCK OR BOX NOS.	BOX WT. LBS.	BOX WT. OZ.
NB	69254	13	615687	102	—

500 AUTOGRAPH HOODS

QUANTITY ORDERED	NUMBER PER BOX	DATE ORDERED
108	108	12/7/14

OPERATION NUMBER AND DEPARTMENT LETTER	QUANTITY OF PARTS ORDERED	DATE FINISHED WORK MO.	DATE FINISHED WORK DAY	WORKMAN'S CHECK NO.	X IN I	GAUGED BY	QUANTITY SENT AHEAD	LOSS OR GAIN
19 S	108	12	8	14841				
62 S			10	30003				
15-53 "			14	30081				
11 "			15	30180				
157 "			17	30630				
66			18	1				
44			21	14089				
35 S			23	14641				
34 S			24	14019				
34			26	13078				
32 R			28	13094				
67			29	2				
26 S			30	27006	R			

Monthly Usage _____ Bin No. _____

Form 213

A PRODUCTION CARD.

figured on the hourly piecework job rate, which in this instance is $0.2325.

If it is desired to add a premium for the extra effort put forth and that the workmen should have a share in the savings effected, add the per cent. of premium to the piecework job rate. For instance, it may be desired that the workmen earn on piecework 25 per cent. over their day rate. 25 per cent. added to $0.2325 gives $0.2906, or in round figures $0.291, which becomes the piecework job rate, and all prices would be figured on that basis.

DISTRIBUTION OF EARNINGS.

All piecework tickets are made out to the job instead of to the individual and in order to separate each man's share of the earnings in proportion to his hourly rate, the total earnings for a given period (a week is the best unit of time) are divided according to the

rate of pay and the number of hours each man has worked on the gang.

If all of the men have worked the full week, say 55 hours, their equivalent daywork earnings would be: five men at .25 per hour, $68.75; three men at .225 per hour, $37.12; two men at .20 per hour, $22.00; total, $127.87. If their piecework earnings for the week should amount to $159.85, divide the piecework earnings by the daywork time equivalent and the result will be the per cent. of increase the job has earned.

Thus: $127.87 = 100%. $\frac{\$159.85}{\$127.87} = 125\%$.

Each man's share, therefore, amounts to 125% of his daywork time equivalent as follows: a 25c. per hour man on straight daywork would have received $13.75; 125% of that would amount to $17.18; a 22.5c. per hour man on straight daywork would have received $12.37; 125% of that would be $15.46; a 20c. per hour man on straight daywork would have received $11.00; 125% of that would be $13.75.

Total earnings		$159.85
Five men at.....	$17.18 =	$85.90
Three men at.....	15.46 =	46.40
Two men at.....	13.75 =	27.50
		$159.80

METHOD OF ACCOUNTING.

All parts going through the factory are accompanied by a production card, which gives the order number and part name, the amount of the order, the amount in the lot, date ordered and when due, the operation number and department letter in which the operation is to be performed. This card and an instruction ticket accompanies the lot. Before the workman starts the job the production card and instruction ticket are sent to the department office, where the piecework price is placed on the instruction ticket. This is the workman's instruction to proceed with the job and informs him what the piecework price is. After the work is finished the card and instruction ticket are returned to the office and the piecework ticket is made out, showing the order number, part name, quantity in the lot, operation number, job number, next operation number and department letter, quantity claimed, price per 100 and the date. The time started and time finished is placed on the ticket if made out for an individual pieceworker, but not if made out for a gang, as the time would overlap owing to the number of jobs in work at one time.

This piecework ticket is a three-ply ticket. The original is torn off and goes to the paymaster's department for payroll purposes, one duplicate goes to the stock department for entry on the tracing record and the second duplicate becomes the instruction ticket for the next operation, is attached to the production card and goes with the stock.

METHOD OF RECORDING OPERATION AND PRICES.

The piecework record is a card file system, each card taking care of one part. The face of the card shows the order number, the part name and finish (specified by letter), the operations and operation numbers done in the department, next operation number and department letter, price per 100, the date prices were set and space for change of prices at next tryout. The reverse of the card provides spaces for the date of the last tryout, the operation numbers, the last piecework price, the number of parts handled in the last tryout and the time required to make the last tryout. This card system is in duplicate, one set being kept in the department office and the other in the paymaster's department. The paymaster's file is kept up from duplicate copies of the tryout ticket. The piecework file record in The National Cash Register Company's plating department covers a few more than 8,000 parts and over 11,000 prices.

SPELTER AND ITS USES.

The very ingenuous design which we show below has been adopted by a mining company called the Connecticut Zinc Corporation. We have reproduced the design in order to give our readers some idea of the diversified uses of the metal zinc. It will be seen by a close study of the "tree" that there is hardly an industry that does not employ zinc in some form or other. About the only criticism we would have to make about this design is in the branch allotted to bronze. Zinc, it is true, is used in bronze making, but probably not to the extent represented by this branch. Zinc is used in the role of a

USES OF SPELTER.

deoxidizer in certain mixtures such as the Government mixture of 88 copper, 10 tin and 2 zinc, but a much larger percentage is contained in high copper mixtures which are termed low brass, and we should change the main branch to low brass with bronze for a smaller branch or twig of it.

However, we believe that it is not generally known that there is such a wide application of the metal, called spelter in its cast form and zinc when rolled, spun or drawn. Some interesting statistics relating to the production of zinc and its connection with the population are as follows:

1890—Population, 72,000,000. Tons of zinc metal produced, 65,000.
1900— " 84,000,000. Tons of zinc metal produced, 131,000.
1912— " 94,000,000. Tons of zinc metal produced, 338,000.
1912—Consumption, 340,000 tons.

This shows an increase in population in 23 years of 34 per cent.

This shows an increase in consumption in 23 years of 540 per cent.

BRASS FOUNDRY EQUIPMENT AND MANAGEMENT

SOME COMMON SENSE REMARKS BY AN EXPERT FOR THE BENEFIT OF THE TRADE.

BY W. H. PARRY.*

To equip and manage a brass foundry, whether it is a jobbing or manufacturing outfit, is not such a staggering task as many of the old school of mechanics would lead people to believe. For the benefit of the many owners of "behind the times" foundries as well as those who intend to start a foundry of their own it might be well to lay down a few simple rules and kinks that will put them in the way of making a stab at getting seventy-five cents worth of results for every dollar they spend, and in order that not so many foundries will be conducted on the "fifty-fifty" basis, which being interpreted means, that the workmen give but fifty per cent. of their efficiency and lose fifty per cent. of the castings in return for every dollar that the boss spends on the foundry.

It hardly seems possible that one brass foundry could be so managed that the owner of it could be robbed or jobbed to such an extent that he had to look for his profits from the chips that were made in his finishing department, and as he sported an automobile and attended every big league ball game there must have been some chips!

THE MOLDERS' TUB OR BENCH?

To start with, let us take up the ancient old ark known as the molders' tub. If you have been using them and still think that they are the goods, then there is no hope for you. On the other hand if instead you care to listen to ordinary every-day reason, then it won't be a hard job to convince you that a tub is one of the most expensive pieces of furniture ever placed in a foundry. In the first place it is associated with the old tradition of the brass foundry which consists mainly of a minimum output. It is considered a crime, even to this day, to produce anything more than thirty 16 by 12 by 5 inch molds for one day's work when using a tub and on certain classes of very ordinary work eighteen molds a day were all that the tub molders could produce. So get rid of the tubs if they are being used or if one expects to start up a plant don't put them in. Use a molders' bench instead, that can be purchased from any of the foundry supply houses. These machines are made of pipe with a couple of cleats fastened to them for the pattern and bottom boards to rest on while making the molds. Attach blow guns and vibrators to these benches so that the molder can do his own lifting off. This does away with the nuisance of calling for a helper or another molder to come to his aid and by so doing it saves time and money.

Again the molder's benches, if not placed too close to one another, will automatically provide ample space for the storage of sand on either side so that it can be tempered and riddled by help other than molders. If compressed air on tap or electric current is obtainable it can be used for operating an air shaker or gyratory riddle, either of which will handle more sand than one man can shovel into them. On either side of the molder's benches are provided shelves for molder's tools and dust bag. They are not large enough for the storage of any but the very small patterns, which in itself is a good thing, as patterns are not so apt to be lost as they are in the tubs, so that all things considered the old time molder's tub should be eliminated.

Perforated cast iron bottom "boards" are a big improvement over the wood species so much in evidence in many of the foundries and are much cheaper in the end. The kind with square holes are the easiest for the iron foundryman, who will make them for you, to cast straight. It will also be found that the men can bed down these plates much faster than those made of wood, and as they do not warp and can be made at even thickness they will apply more readily to molding machine requirements, and those who are experienced with these machines will say that the closer they are adjusted to the job at hand the better the output. There is no fear on my part of being contradicted in this particular statement, as anybody who has attempted to get good work and lots of it with only crooked and warped wooden bottom boards to use can also testify.

FALLACY OF SNAP FLASKS.

The old practice of clamping the flasks and pouring the molds on the end or side is all but a thing of the musty past, and the claim of many brass founders of the present era that molds made in a brass foundry must be encased in a flask when being poured is fallacious. In order to prove that it is, one has only to visit most any iron foundry and witness the making of molds in snap flasks which very frequently have no jackets slipped over them, if the work is both shallow and light. It follows then that as the specific gravity of brass is not so much greater than iron and the copes are no higher or at least the crucible is not held at a greater distance from the sprue hole when pouring, the conditions are pretty near as favorable as they are in an iron foundry. I would be real sorry for the man who would have the temerity to tell an iron foundryman that it was against the rules to attempt to pour molten gray iron into a mold not stiffened by a flask or slip jacket, and yet they have the colossal nerve to hand out that information to those intending to start their own brass foundry.

A few words further on this snap flask business before we drop the subject. It must be borne in mind that judgment has got to be used in determining what can be and what cannot be poured successfully into a snap flask mold. A foundryman would not expect to be able to pour a car bearing into a mold that was so proportioned that it would not withstand the pressure due to the volume and head, anymore than you would insist on encasing a mold in a steel flask when the castings weighed ounces and with a low head at that. The snap flask with the tapered sides is the best to use if slip jackets are essential, as they lend themselves to the more rapid placing of same in position after the molds have been placed on the floor; although the steel jackets that are placed inside of the snap flasks have their good points too, and there is possibly some advantage in their use because there is less likelihood of a "shift" occurring. In any event an enormous saving in real money can be made by using snap flasks at the rate of one to each operator if standard sizes are used with a few special sizes kept on hand for smaller or larger work as against hundred of expensive cast iron or steel flasks that many old time foundries will persist in clinging to even to this day.

CHOICE OF MOLDING MACHINES.

If you are in doubt as to what make of molding machine to install suppose you play safe and start cheaply by buying the hand squeezer variety that costs from twenty-five to forty dollars a piece, with another ten dollars for vibrators. Rig the work on them, but do not put a molder on the job, as they will find all kinds of faults

*Superintendent, National Meter Company, Brooklyn, N. Y.

(all imaginary) in their efforts to discourage their use. Take a laborer with an intelligence almost human and break him in, always with the promise of more money if he makes good, and you will find that he will work his head off in his anxiety to get the coin. Eventually you will get a day's work that will open your eyes, and as he progresses in skill keep on paying him more and more; yes, even up to the journeyman molder's wages, as you will find by that time he will be producing twice or three times more molds than the journeyman ever did. So why should not the operator receive good money when his output is a great deal more than that of the journeyman.

(To be continued.)

ETCHING BY THE TRANSFER PROCESS

A Description of an Interesting Process for the Decoration of Metals as Adopted by John R. Baynes.*

By H. B. B.

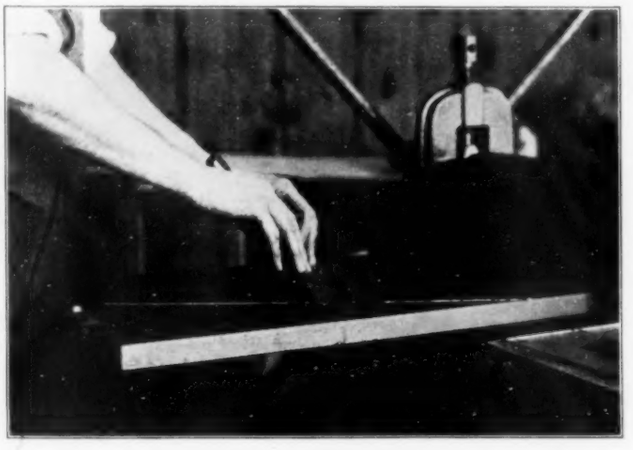
The general belief up to the present time has been that high class etching of metals could be accomplished only by means of one process, the photographic; therefore this article is intended to show that the method known as the transfer process can produce work of a most wonderful character, and second, if not equal to that of the photographic, while the variety of its uses are unlimited. There are several methods used in the cutting or etching of metals. The best known of which are: the rubber stamp process, the process of painting the design directly upon the surface to be etched, the photographic process, and the transfer process.

The method, first mentioned, the rubber stamp is limited in its scope, owing to the imperfect character of the pattern used, and is suitable only in the marking of knife-blades, cutlery, etc., and in the cheapest grade of etching where line work is called for; the second, the method where the design is painted on the metal (by means of a resist) requires skilled labor and can be applied only to each article separately, therefore is not adapted to work in quantity and is expensive; the third, the photographic, while having a great variety of uses, and being capable of producing etched work of a most perfect character, nevertheless has its limitations and is extremely slow and costly; the fourth, the transfer method, the one to which this article is devoted, eliminates many of the impractical features of the other processes and holds great advantages over each when worked with intelligence.

The two strong features of this process, which in themselves will recommend it to manufacturers, are its simplicity, and its practicability. Let us consider its simplicity. This is best illustrated by the fact that it can be worked throughout by unskilled labor. Any person of ordinary intelligence can be taught the entire process in a few days time, and under slight direction can go through all of the operations, from the printing of the paper pattern on the press, to the cutting of the metal in the acid tank. These facts establish its simplicity. Now as regards its practicability. This can be shown by the many uses to which the process can be put. Mr. Baynes has proved, as can be judged somewhat by the few accompanying illustrations, that any metal object, whatever its shape or form, can be decorated by this method.

While the stripped photographic film (which is costly and perishable) can be used as a pattern and made to conform to a curved or even a double curved surface, the operation is a slow and delicate one, and is practical only on gold and sterling silver ware. To the contrary, the paper transfer pattern lends its self readily to complex shapes, and can be used to cover a variety of forms, such as tubes, indented surfaces, spheres and squares, spiral shaped articles, single or double curved surfaces, etc, with equally good results. For the benefit of the manufacturers we will enumerate some of the articles which can be marked or ornamented by this method. The list includes tools of all descriptions, saws, etc., name plates, signs and tablets, dies, rules and instruments of precision, copper and steel rollers for printing purposes, gun-barrels, architectural pieces, tubing square and round, bottle-cases, loving cups, etc., clocks and dials of every description, and many articles of jewelry, such as belt buckles and pins (for enameling especially), also vanity cases, powder-boxes and toilet articles. We would mention that the metals these articles represent cover also a wide range, i. e., brass, copper, zinc, bronze, steel, Brittania metal, German and sterling silver. Having stated the foregoing facts concerning the process, we will now proceed with one of the formulae as adapted by Mr. Baynes.

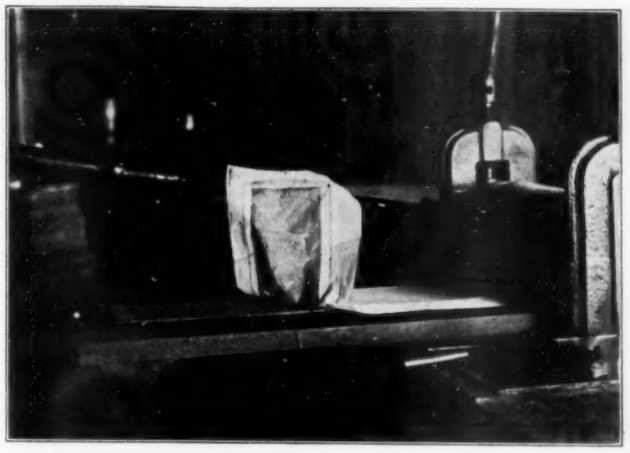
NO. 1. SHOWING TYPE OF PRESS EMPLOYED.



NO. 2. FILLING THE PLATE WITH INK.

*Vineland, N. J.

It is already understood by many who have a knowledge of etching that the pattern used in this method is a paper transfer pattern, which is struck off from a copper or steel plate, known as the master-plate, by means of a copper-plate press (the type of this press is shown in illustration No. 1), a letter press may also be used. This master-plate is an etched or hand-engraved plate,



NO. 3. PRINT PARTIALLY DRAWN FROM PLATE.

made of either copper or steel, on which the design is represented by lines depressed or sunk in the metal.

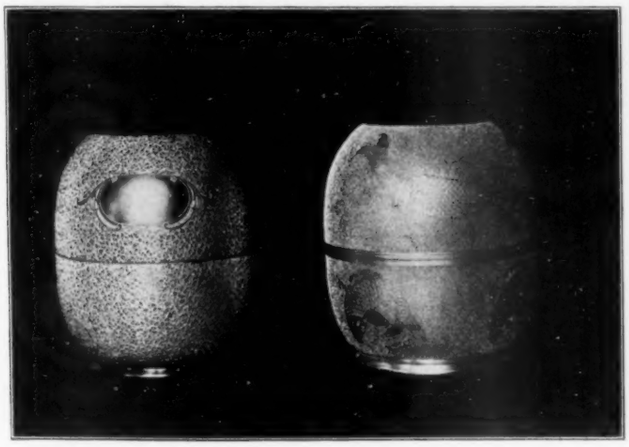
It is necessary therefore to first procure the master-plate. After this has been obtained, the transfer paper is prepared.

FORMULA AND DIRECTIONS FOR COATING PAPER.

THE PASTE.

Flour or starch	1 teaspoonful.
Water (cold)	3 ounces.
Water (boiling)	4 ounces.
Glycerine	25 drops.

Mix flour and cold water to a smooth paste; add glyc-



STERLING SILVER VACUUM BOTTLE CASES DECORATED BY THE BAYNES METHOD.

erine to boiling water and stir the two slowly into the paste to avoid lumping; if lumps remain the whole may be strained through cheese-cloth.

The transfer paper should be made from a good quality of pliable tissue paper. It is prepared as follows: Cover paper, one side only, with a thin, even coating of the flour or starch paste by means of a soft sponge or a flat camel's hair brush. Allow sheets to hang in a vertical position until thoroughly dry, after which cut into pieces of about the size of the plates to be printed.

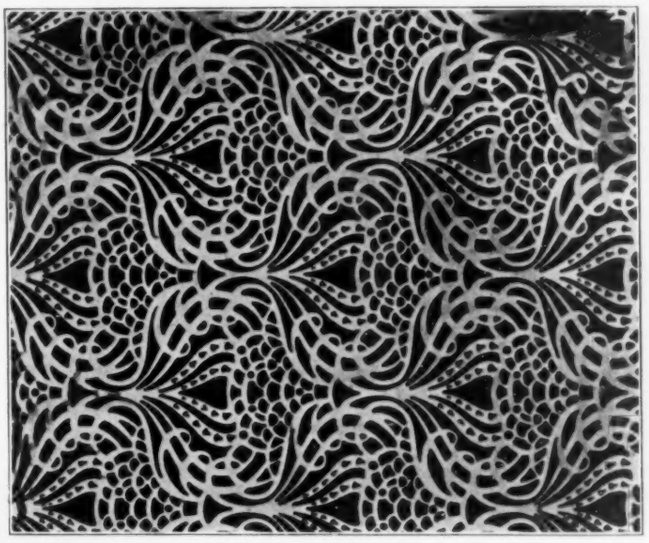
FORMULA FOR ETCHING INK.

Beeswax	5 ounces.
Egyptian asphalt	¾ ounces.
Bayberry wax	1 ounce.
Aniline color (Sol. in oil)	½ ounce.
Rosin	¼ ounce.
and	
Turpentine	1¾ ounces.

Melt first five ingredients over fire and strain through cheese-cloth. Remove from the fire, then add the turpentine. Stir all thoroughly and allow to cool.

N. B. Caution.—Never add turpentine while mixture is over the fire; it is dangerous.

The ink, made according to the above formula, is now used to fill the plate, preparatory to printing (a putty knife or any flat piece of steel may be employed for filling). Force the ink into the depressions of the plate with tool mentioned (as shown in illustration No. 2), and use same to scrape away all superfluous ink. The result



PIERCED SHEET COPPER NO. 26 GAUGE.

will be that the depressed lines are now filled with ink, flush with the surface of the plate.

After the master has been filled, as per directions, place it (face upwards) on the bed of the press. Lay upon it a piece of transfer paper, coated side down, cover with a blanket (made of either sheet rubber, or a piece of closely woven cloth) and run same through press. By this operation the paper is driven into close contact with the ink contained in the depressions of the plate.

Remove blanket and draw paper (as shown in illustration No. 3). The ink held in the plate is released, and being tacky in nature, adheres to the coated surface of the paper.

The print is now ready for transferring to the object to be decorated. If the surface of the object is flat, the print is placed in the position desired, and forced into contact by a firm pressure of the hand, or the use of a small rubber roller; in the case of an object whose surface is curved the same method is employed, but it is generally necessary to cut the paper so that it will conform to the shape of the curve. (No set rule for the cutting can be given owing to the great variety of forms, and this must be left entirely to the judgment of the operator.)

The print having been pressed or rolled into contact, it is now necessary to release the paper. This is accomplished by moistening with a wet sponge, and holding for a few seconds under a tap of running water. The water by dissolving the starchy coating releases the paper and leaves the print on the face of the metal in the form of an inky design in relief. The ink represents the resist and protects the metals which it covers from the action of the acid. Thus, it must be borne in mind, that the parts of the design covered by the ink are the parts which will remain in relief after the cutting.

Before placing the articles, thus treated, in the etching bath, care must be taken to coat all the exposed parts which are not intended to be etched. A common method is to brush such places over with either asphaltum or shellac varnish. In regard to the etching bath employed it is not practical here to give formulas which will answer for the cutting of such a variety of metals as are mentioned in this article. In general, however, we will state that in the case of brass, copper, bronze, steel, German silver and Britannia metal a diluted solution of nitric acid is used.

The required strength of the solution cannot be accurately given owing to the varying changes of temperature under which it is worked, all of which affects its action, etc. An approximate temperature should be between 80 and 90 degrees F. The best results in etching of nearly every description are obtained by slow cutting of the metal (i. e., slow action of the acid), in fact slow action gives the cleanest and sharpest results.

Mr. Baynes states that during his twenty years of experience in decorative etching, that there is not one case in twenty where the transfer process cannot be used to advantage. In fact he seldom uses any other method. The work shown in the few accompanying cuts was done by girls trained in the Baynes' process.

DEAD JEWELRY STOCK

SOME IDEAS REGARDING UNSALABLE ARTICLES OF JEWELRY.

BY OSCAR K. HILLMAN.*

The political developments and attendant uncertainties during the first half of ninteen-fourteen, followed by the European cataclysm, have made the past year one long-to-be-remembered in all lines of business, as a year calling for cautious and conservative dealing. This is especially true of the jewelry business, a business whose products have the double disadvantage of being expensive and to a great extent dispensable. Although the manufacturer, wholesaler, jobber and retailer have each been seriously affected, the general condition of the trade is healthy and will start the New Year on a better foundation than it ever had before. The manufacturers have been compelled to eliminate the "deadwood" from their organizations and to keep the cost of production down to a minimum. The jobber and retailer, visualizing additional old stock and clearance sales which are invariably conducted at a loss rather than rush sales and consequent accruement of dividends, have bought only small quantities of such items as seem to indicate a quick "turnover" at a good profit, and have devoted a large part of their attention to pushing the slow-sellers and "stickers" off their shelves.

In my positional capacity I have had an opportunity to examine large quantities of shop-worn and "dead" jewelry that the jewelers have been unable to dispose of, and have sent back to the manufacturer or the job plating shop to be re-finished.

The following brief description of the most prominent characteristics that had a tendency to make them unsalable may not be inopportune.

DEAD STOCK CLASSIFIED.

Dead stock can usually be divided into six classes, viz.:

1. Jewelry where substantiality has been overdone, and the result is that the articles are crude and clumsy-looking. This class includes heavy cigarette cases, made of such heavy stock that they suggest a weight to be carried around rather than a classy receptacle for cigarettes. Veil-pins and barettes that are so heavy that instead of holding the veil or hair in place they actually pull them out of place. This class also includes that acme of abominations—jewelry that is nickel or platinum plated, in imitation of genuine platinum, but is composed of such heavy stock that it reminds the would-be purchaser of stove-trimmings instead of being an imitation of the beautiful airy creations made from solid platinum.

2. Rolled-plate, gold-filled and silver-plated jewelry that has been polished to such an extent that all the plate has been polished off the extreme top of the high-lights. This class includes jewelry of all discriptions, but especially pendants, ear-drops, etc., made from knife-edge wire scrolls, jewelry that has been struck in dies made from engine-turned hubs, and silver-plated articles that have been cut down, then dipped into acid again before being silver-plated. My experience has been that more jewelry is irreparably damaged during the polishing operations than in all the other operations combined. The worst feature of plated jewelry that has been polished through is that it is next to impossible to detect the places where the plate has been removed from the high-lights, as the base metal is identically the same color as the gold plate, and it takes from three to seven weeks for the base metal to become sufficiently tarnished to reveal its true nature.

3. Jewelry that has been made of several small pieces soldered together without any fixed motif. This class consists of pendants, chatelaines, lavallieres, etc., and although some of the articles must have cost considerable to manufacture they invariably have a cheap, "scrappy" appearance.

4. Jewelry where an incongruity exists between the article and the finish applied. Under this class should be listed: chains and bead necks finished in rose gold or French gray, optical goods finished in Roman or old English, silver-plated collar buttons, etc. The retailers themselves have two infallible methods of making "dead" stock. The first is to buy a large quantity of some fad after the popular demand has begun to wane; the other is to stock up with goods not adapted to their class of trade. The jobbers and retailers have every right to expect the manufacturers to keep their sample lines up-to-the-minute by discarding all obsolete samples and to see that every piece of jewelry is made and finished correctly. The average jewelry store has less stock on hand at present than ever before, and if they are going to do any business at all they will have to buy pretty freely for the spring trade, and it rests with the manufacturer more than anyone to decide whether the retailer can dispose of the new stock quickly and be in a position to duplicate his first orders or if the goods are going to become "settlers" in his store all spring and summer.

*Electro-chemist, Attleboro, Mass

FACTORY DRIVES

A Comparison of the Methods of Distribution of Power in a Manufacturing Plant.

By Guion Thompson.*

In deciding on the drive for a factory, a layout of the manufacturing machines should first be made under the supervision of and instructions from, the plant superintendent. He should be the authority in this feature of the work and officially approve of the layout before the method of drive is taken up. The drive may then be laid out and in doing so the engineer should be sure that the superintendent's desires are complied with so far as their effect on the machines may be concerned, but in all other respects he should be the authority. Whether power be purchased or generated or whether group drives, individual drives, motors, belts, shafting, gearing, etc., be used or not, is a matter that the engineer should decide and one which he can decide to the factory's advantage if care is taken to make the manufacturing requirements clear to him.

Individuals are often met with who are in favor of electric drive and others who are just as strongly in favor of belts and shafting, and they will argue indefinitely on the value of the drive they believe in, all the while losing sight of the fact that the demands of the shop are what really determine which drive should be used. The efficiencies of the two drives, considered as drives along, are about thus: With engine belted to line shaft and line shaft belted to machine, the loss of power from engine to machine is about ten or twelve per cent., and from engine to machine with electric drive it is about eighteen or twenty per cent. With the belt and shaft drive there is that constant loss, whether the driven machinery be operating or not, so that with a small percentage of the machines operating the percentage of transmission losses may be as high as eighty per cent., due to the running idle (or unloaded) shafting and belts, while with the electric drive the losses occur only while the machine is operating. To illustrate what this means, suppose, in one case, we have to transmit 100 horse-power to a machine that operates all day. With the belt and shaft drive we will then have a loss of about 12 horse-power for ten hours, or 120 horse-power-hours, and with the electric drive we will have a loss of about 20 horse-power for ten hours, or 200 horse-power-hours.

Then suppose another case, in which we have to transmit 100 horse-power to a machine that operates one-third of the time during the day. With belt and shafting drive we still have the constant loss of 12 horse-power for the whole day, or a total loss of 120 horse-power-hours, while with the electric drive we will have a loss of 20 horse-power for three and one-third hours, or a total of 66 2-3 horse-power-hours, because, when the machine is not operating no energy is circulating in the transmission system, and consequently there are no losses taking place. Therefore, in the first case, belt and shafting drive is the proper one to use, while in the second case we should use electric drive.

There are many cases which are very puzzling to solve, and when it becomes hard to determine which is the proper drive for any department of a mill or factory, the safest method to adopt is that of the adjoining department or that which will work out to the best advantage to the power plant. If, instead of a department, the drive concerns a factory, then we should select that drive which is most advantageous from outside considerations, or even ethical or psychological points of view in place of the purely physical, for in such a case the physical considerations balance and cannot decide the question.

Some cases require a great amount of exhaustive study in order to arrive at a decision, and it is often hard to collect the necessary data to work with, especially that connected with the human element, and the individual's disposition which so often constitutes a large part of the problem. Two foundries are recalled to the writer's attention which illustrate this feature very strongly. A certain type of especially designed hoisting apparatus was installed in each, and the operation and output of each foundry were intended to be identical, but when they started business a force of entirely new men went to work in one while in the other a force of men from an old shop moved in. In the foundry employing the new men the hoisting apparatus proved very successful, but it had to be abandoned in the one employing the old men because they took such a violent dislike to it that the output and morale of the shop was completely demoralized, and the new hoists had to be removed and an old type put in; one that the men were used to.

It is practically impossible to foresee such conditions as these, and yet every effort must be made to do so because it is necessary to consider everything in order that our plans work out smoothly. The above incident also illustrates how one item must sometimes be, in itself, inefficient, in order that the whole may be efficient. In other words, the most efficient method or piece of apparatus is that which does its part in a business enterprise so that that enterprise, as a whole, is carried on in a highly efficient manner. It is often possible to become so interested in improving the efficiency of some part or item in a process of manufacture, as to lose sight of how that improvement may be affecting the balance of the process, with the result that the over-all efficiency has been reduced.

Examples of conditions calling for certain drives are: First, a carpenter or case shop, in which the individual electric drive will usually be found the most economical because the machines are mostly used singly, a 5 horse-power cutoff saw a few minutes at a time here and there through the day, or a 50 horse-power plainer more or less often, sometimes for short and sometimes for long periods. Second, a machine shop with a large number of small machines and one or two large ones that are used intermittently. The small machines should be grouped according to demands, and connected to a motor so that they can be used without running the whole shop. The large machines should be individually driven by separate motors. Third, a heavy machine shop, in which the machines should all be individually motored. Fourth, a power press room where most of the machines are in continuous operation most of the time. In this case they should all be driven by belts from a main shaft. If such a plant is large, it will ususally be found an economy to drive sections or different departments by one motor each so that any section may be shut down without leaving the main shaft running or necessitating the shutting down of the whole plant.

The cost of purchased power as compared to power generated on the premises is an interesting problem. It is a fact that a factory can buy power for less than they can generate it and the power company make a profit in some cases, but more often the factory can generate their own

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power for less than they can buy it. In shops of such size as to require attendants for the heating plant and to care for the operating machinery, that same attendance can care for the power plant machinery so that the cost of power in this case is the interest and depreciation on the machinery plus the cost of fuel, which almost always amounts to less than the power can be purchased for from the power company. In small shops where the attendance necessary for heating plant and care of mechanical equipment is a small part of the duties of one of the operating hands, purchased power will almost invariably be found to be the cheapest, even at high rates.

PREPARATION OF VARIOUS CHEMICAL SALTS

SOME DIRECTIONS FOR THE AID OF THE PRACTICAL PLATER.

BY CHARLES H. PROCTOR.

GOLD CHLORIDE.

Gold chloride is prepared in the following manner: Prepare a mixture of aqua regia, consisting of three parts of pure hydrochloric acid and one part of pure nitric acid mixed thoroughly together. Pure gold should only be used for making gold chloride and it should be cut up into small pieces and placed in a porcelain evaporating dish, heated to near the boiling point by the aid of a water or sand bath. Now add the acid mixture slowly. Not more than two ounces of aqua regia to one ounce of gold should be added first. The idea is to keep a saturated solution without an excess of acid, so that it is important to use only just sufficient acid to dissolve the gold.

After the gold has been dissolved the heat should be maintained to evaporate as much of the acids as possible and produce a syrupy mixture. The gold chloride is then ready for use or may be converted to the fulminates by precipitating with ammonia water and filtering and washing the precipitate. This operation requires extreme care or considerable gold will be lost in this operation.

SILVER CHLORIDE.

To prepare silver chloride proceed in a similar manner as when preparing chloride of gold.

Acid proof jars or porcelain evaporating dishes should be used for the purpose, depending upon the amount of metallic silver to be converted. An arrangement should be made for heating this receptacle to the boiling point by sand or water baths or by direct heat.

The acid mixture consists of equal parts of pure nitric acid and water, preferably distilled water. It requires approximately two ounces of the acid mixture to dissolve one ounce of pure metallic silver. But the same care should be exercised as in the preparing of gold chloride, although it is not necessary in either case to evaporate to the crystalline form when the material is to be used directly for plating solutions. After the silver is all dissolved as silver nitrate allow to cool and then add an equal amount of water to the mixture and precipitate as chloride by the aid of a concentrated solution of common salt or hydrochloric acid, the latter being preferred. Add slowly to the silver nitrate until the silver is all precipitated in the form of a white plastic powder and a little of the clear solution should be tested separately so that it can be determined whether all the silver is precipitated. Afterwards allow the precipitated silver to settle and then syphon off the clear solution of nitrate of sodium which is of no value. The precipitate must now be washed carefully for a number of times until the wash water is no longer acid to blue litmus paper test. The silver chloride is then ready for use in solution by conversion with cyanides.

SILVER CYANIDE.

In order to make silver cyanide proceed as far as reducing the silver as nitrate as previously described in the preparation of silver chloride and add an equal amount of water. Afterwards prepare a concentrated solution of cyanide 98.99 per cent. in warm water. For every ounce of metallic silver it will require one ounce of cyanide or slightly more to produce the single cyanide of silver. Add the cyanide solution carefully until all the silver is precipitated from the nitrate solution in the same manner as when producing the chloride. Make a separate test to see that all the silver is precipitated. This operation requires much care in order to avoid an excess of cyanide in precipitating, otherwise considerable silver will be lost in the washing.

After precipitating, remove the clear solution of potassium nitrate (which is of no value) and wash the precipitate a number of times, as previously mentioned for producing silver chloride. The remaining precipitate is single silver cyanide and in order to convert to double cyanide it will require an additional 1¼ ounces of cyanide more or less and an additional ounce for free cyanide for practical results.

It is far cheaper to purchase silver cyanide owing to its low price than to convert it, unless this is accomplished on an extensive scale. It is also cheaper to buy chloride of gold.

ZINC SMELTING IN AUSTRALIA.

It is reported that the smelting of zinc, which has been the mainstay of the German zinc smelting business, is about to be lost to that country. The Australian production of zinc ore, which has in recent years been the largest single source of spelter in the world, has heretofore gone to Germany for smelting. Due to the interruption of the war, this has been stopped and the Australian producers have been forced to look elsewhere for an outlet of their ore production.

Negotiations, therefore, are now in progress between the zinc corporation and other Australian producers for a combination of their interests in the smelting of their output. To this end the American Smelting and Refining Company is now in consultation with these Australian concerns for the erection of new smelting works. Therefore it looks as though there is an impending revolution in zinc smelting which will make a material difference to the German and Belgian smelters.

ALLOY OF ALUMINUM FITS MANY USAGES.

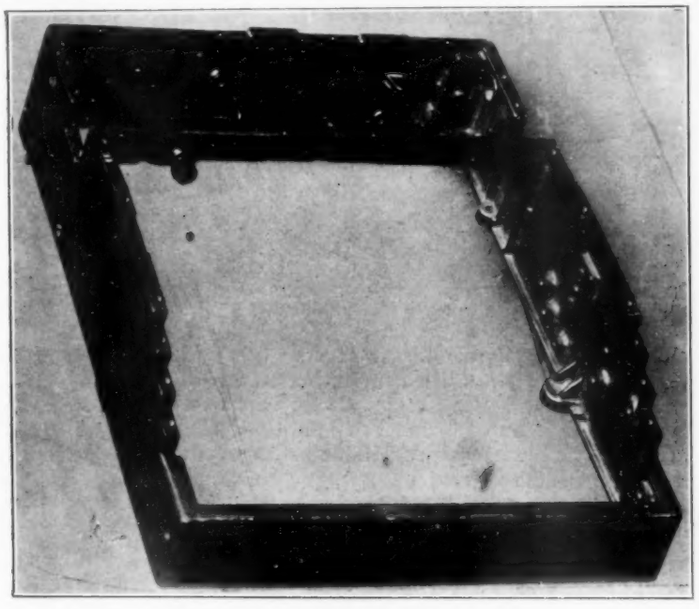
Claimed to be suited for almost limitless uses, an alloy of aluminum and nickel which does not tarnish and which couples the elements of lightness and strength is reported to have been developed in England. The metal has practically the same specific gravity as aluminum, its principal base, is white and takes a high polish. While extremely malleable it does not become brittle by pounding, but instead increases in hardness. A sheet of the alloy was towed for almost six months in the ocean by a steamer operating between England and New Zealand, and at the end of that time was found to be as bright as when first put in the water, it is asserted. Promoters of the alloy contend that it is particularly adapted for internal combustion engines, marine fittings, medical apparatus, and similar uses. It has a tensile strength of 13 tons to the square inch.

PRECISION CASTINGS

AN ARTICLE DEALING WITH THE PRODUCTION OF DIE MOLDED PARTS.

BY EARLE BUCKINGHAM.

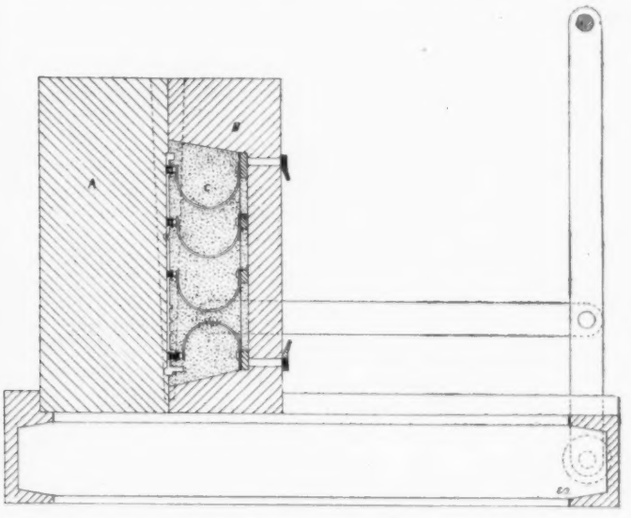
Very few machine shops use enough castings to make it pay for them to have their own foundries. As a consequence their work is done by an outside concern that also handles work from many other places. The machine shop considers that its part of the work is done by merely furnishing patterns, and these are not always of the best, while the foundry must take care of the rest. The foundry is concerned principally in getting the best castings possible from the patterns in hand, seldom getting much credit for the difficulties that they overcome, and their interest in the product ceases when the castings are accepted. They have little care and less knowledge of the machine work to be done upon them and their ultimate use. Therefor it is not to be expected of them to attempt to show the machine shop how machine work might be partially eliminated in the foundry. The interest of the



A TYPEWRITER FRAME.

foundry is directed in another direction. Their efforts are directed toward perfecting means to produce castings from the patterns furnished them in a simple, effective manner as cheaply as is consistent with good quality. The result of these efforts has produced the moulding machines, which are producing very good results. But even these cannot be fully perfected without co-operation between the machine shop and the foundry. If the machine shop does not furnish suitable patterns to be used on these machines it would not pay for the foundry to install them. And without good patronage the moulding machine companies cannot afford to spend their time and money to experiment with and improve their product. It is unfortunate that so little interest is taken by the machine shop in foundry work. With hearty co-operation on both sides much could be done to improve the quality of the work and to save time and money for both. The first move should come from the machine shop, but the foundry must show a willingness to work out the desires of the machine shop, no matter how contrary they may be to their general practice, at the same time giving the machine shop the benefit of their practical experience and pointing out any evident errors in their plans. Working from the results of any such experiments, both parties should develop together a process to eliminate any faults in the result.

The machine shop has developed the die casting. This shows what can be done in casting to eliminate machining. This branch of casting is a specialty and properly belongs in the machine shop. There is no moulding, as all of the dies are of metal and must be made by expert tool makers. A well-built casting die is one of the finest examples of the tool makers' art. The metal is soft and melts at a very low temperature and the pouring is done mechanically. But little floor space is needed by the casting machines in comparison to the large amount required by the tool room. This naturally classes die casting as machine shop work.

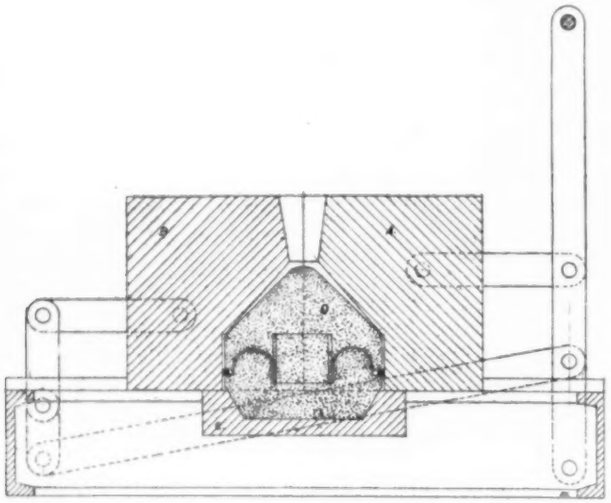


METAL MOULD WITH SAND CORE FOR CASTING SIDE OF FRAME.

Castings made in sand moulds vary considerably. This is due to several causes. The rapping of the pattern is harder at some times than at others. This causes a variation in the size and shape of the mould. Some moulds are rammed harder than others. The molten metal forces out the looser mould thus producing a larger casting. Small corners of the mould are always liable to break off or be washed away, thus producing a rough and imperfect casting. The moulding machines have partially overcome most of these defects, but some variation is yet apparent. Except at working points this slight variation has but little importance. Yet if this variation were entirely eliminated, a surface cast in sand would seldom be smooth enough for a working surface. If it is desired to produce this working surface in the foundry, some new method must be employed.

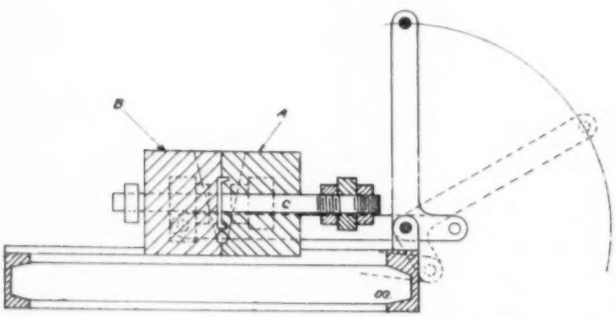
Castings made in metal moulds vary but a few thousandths of an inch and have a smooth surface. It has not yet been found to be very practical to core small holes with metal cores in metals such as cast iron, brass or aluminum. The cores are often warped and

burned off by the heat of the molten metal; while the metal shrinks so tightly to the cores that it is often impossible to withdraw them. Projecing lugs and other irregular places are very difficult to cast in metal moulds. The alloys used for die castings, usually with



METAL MOULD WITH SAND CORE FOR CASTING FRAME COMPLETE.

tin as a base, melt at such a low temperature and have so little shrinkage that these difficulties are not met with there. To overcome these difficulties with the harder metals and alloys, if it is desired to use metal moulds, the castings should be so designed that the parts to be cast against the metal moulds would be



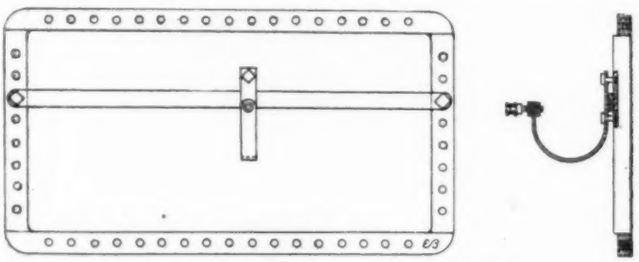
METAL MOULD TO CAST FRONT OF FRAME.

smooth and regular, while any bosses or reinforcing ribs would be formed by a sand core placed in the metal mould.

To produce a small hole or a finished surface on a boss cast by the sand mould, it seems as though some machine work would be required. Under these conditions let a finished bushing be cast into the part in its proper position. It would be far cheaper to finish these bushings in an automatic screw machine than to finish the holes and bosses on each separate casting. A frame should be made to hold the bushings from twisting in any way, but yet be flexible enough to allow these bushings to shrink together as the metal cools without creating any injurious stresses in the casting. This frame would be buried in the sand core and only the bushings would project into the mould. The bushings could be fastened to the frame by a boy and this work would not be very expensive. The frame with the bushings attached would be located in the core box by holes into which the bushings would fit, and the sand would then be rammed around the frame without much additional work. These cores might be made on a jarring machine and then the frame should cause no trouble at all.

Instead of a bushing a bracket might be cast in position on another casting, thus saving some of the machining necessary to hold them together. This bracket would be machined where necessary and then be cast in position. A casting might be constructed of several of such brackets or parts, machined independently and then cast together. Even with the same amount of machine work in both cases the cost would probably be much less to handle the several smaller pieces than to handle one very large piece. Parts could be made in this manner that would be impossible to duplicate with the present methods of machining. A finished boss or tapped hole could be placed in any necessary place without any consideration as to how it would be machined. Whether or not the machine could be readily assembled would be the only question.

To illustrate this process, I shall take a typewriter frame now made in four parts and machined in the usual manner, and first try to show how it might be



ADJUSTABLE FRAME FOR JOBBING WORK.

made in the four parts as at present but with most of the machining eliminated, and then try to show how it might be cast in a single part. This frame is now made of cast iron or bronze, depending upon the specifications, but with a process as described aluminum could be used to great advantage.

The first part considered will be the front of the frame. This piece has no bosses or finished points and a cast iron mould of the usual type will serve. The mould would be made in two parts mounted on a base, one part stationary and the other movable. The operation of this mould is very simple. After the casting is poured, the operating handle is pulled back, thus opening the mould. When the movable part has traveled back a certain distance, the lugs on the sides pick up the collars on the rods operating the ejectors, and the casting is ejected from the mould. The gate is so made that the metal enters from the bottom of the mould and forces the air out through the small space of four or five thousandths of an inch between the two parts of the mould. This space, however, is too small to allow the metal to flow into it. Two pieces would be cast at one operation and the mould could be poured about as fast as it could be operated. The heavy body of the mould is necessary to withstand the heat of the molten metal. Aluminum could use a lighter mould than brass or bronze, as the melting point of aluminum is so much lower than that of the other metals.

The moulds for the sides and back of the frame will be more elaborate than the one for the front, but they will save much more machine work. These moulds will all be similar so that one example will illustrate

them all. The mould for one of the sides is shown, constructed similarly to the mould for the front of the frame, but containing a green sand core in which is buried the flexible fixture carrying the finished bushings. The operation of this mould is practically the same as that of the mould previously described, but there is no need of ejectors here. The casting would be drawn out by the movable part and be removed from the mould with the sand core still attached to it. It would be work for a boy to break this core away and to remove the fixture from the casting. The mould would then be cleaned, new sand cores inserted and closed and poured again. This mould could be poured as fast as it could be operated, but the operation would be somewhat slower than that of the first mould because of the extra work of placing the cores. Two castings could be made at each operation of this mould also.

The spring arms carrying the bushings should be just stiff enough to prevent the bushings from being displaced while the mould is being poured, yet flexible enough to allow the metal to shrink without producing any damaging strains. With aluminum in particular, great care must be taken not to have these arms too rigid because of the great weakness of this metal when cooling. This type of fixture could be used in a sand mould if desired, or a cast iron drag could be used with a sand cope carrying the fixture. This last method might be even more efficient and cheaper than the metal moulds described.

The machining necessary to fasten these four parts of the typewriter frame together has not been eliminated by the foregoing process, but that work is but a small part of the whole. These parts might, however, be made as a single piece. This would reduce the machine work to a minimum, leaving but a very small amount of work to be done after the casting left the foundry. The mould to make this casting would consist of a stationary base, two movable parts and the sand core. The operation of this mould would be similar to that of the moulds preceding. The core would be placed in the base, while both movable parts would be moved by the same operating handle. The movable parts of all of these moulds may be mounted on rolls for easier manipulation if desired. The parts of the mould would be located by dowels in their proper relations to each other when in the casting position. They would be also equipped with some locking device to hold them firmly together when closed.

The use of metal moulds is profitable only when large numbers of duplicate parts are needed. It might seem as though the use of such a flexible fixture as described would be unprofitable for small numbers of castings. But if such a process should be practical, it could be used for small orders by using a universal style of fixture similar to the one illustrated. The locating holes for the bushings would be made in the pattern and the bushings attached to the arms would be carefully located in their proper holes. These arms would then be clamped to the bars on the universal frame.

There is a practice used in connection with the die casting process that could be adapted to advantage to other lines of work. This practice is to make the castings in a vacuum. There are many advantages connected with this process. With aluminum in particular this would be of very great value. The metal should be melted in the vacuum to get the best results. The many injurious gases that enter into metals in their molten state would be eliminated and the castings would be of a more dense and fine grain, free from blow holes. These castings would be far more homogeneous, soft and ductile than ordinary castings and would be stronger with greater wearing qualities. Tungsten and tantalum are examples of what this process can do. These metals are so brittle that they cannot be rolled or drawn when worked by ordinary methods. When melted in a vacuum they can be easily drawn into wire for incandescent lamps. Castings poured in a vacuum would fill out all the crevises and corners of the mould and a sharp, perfect casting would thus be obtained.

The great disadvantage of this process is that in most cases such an elaborate equipment is used. A very simple and practical way of casting in this manner would be to construct a small vacuum chamber. Here a metal mould would be of advantage because of the small amount of floor space that it requires, but sand moulds could be used if desired. The moulds would be placed in this chamber and the metal should be melted there also. Electricity could be best used to melt the metal, but a melting device using gas could be made if necessary. The work of pouring the moulds could be done in the usual manner. The men to do this work would be equipped with helmets, similar to a diver's helmet, and supplied with air from the outside. This would do away with the elaborate mechanical devices usually employed. By means of an intermediate chamber, new moulds could be brought into the vacuum chamber and the old ones removed. This method would make but little change in the present foundry practice, and the greatly improved castings would more than pay for their increased cost.

I have endeavored to point out a few of the possibilities that may be developed in the foundry. Without a doubt there are many others fully as important. The style of permanent moulds described is in successful use today. The method of casting bushings in place to produce the finished points would need to be experimented with, although I have heard of a similar method in successful use at present. The value of both melting and casting metals in a vacuum has been proved by the results gained with the die casting and other processes; while the value of the co-operation between the machine shop and the foundry which would be needed to conduct any such experiments properly, could not be over estimated.

This process would save much floor space and machinery in the machine shop. All of the finished places on the castings would still be machined, but that machining would be done on automatic screw machines or turret lathes, where now it requires not only a large equipment of jigs and fixtures but also a large number of machine tools. A large number of fixtures for carrying the bushings would still be needed, but as all the fixtures for the same part would be identical, these could be made quite cheaply. The use of permanent moulds would save much floor space in the foundry and also save much of the expense of moulding.

It is a well known fact that the outside of a casting is tougher than the inside. On many castings no machining would be necessary and so this tough outside skin would remain intact, thus producing a stronger part. Aluminum castings would be made with steel bearing points, and so this metal could be used, producing a much lighter piece, where now it is too soft to do the work required. Any experiments conducted by the machine shop and foundry working together, no matter how barren of immediate results they might be, would not be work wasted if it brought them to a better understanding of each other's work.

THE CRUCIBLE BUSINESS

SOME REMINISCENCES OF AN EXPERT MANUFACTURER LOOKING BACKWARD A QUARTER CENTURY.

BY JONATHAN BARTLEY.*

When a number of my friends in the crucible business first suggested my writing an article under the above heading I thought the subject a very easy one to deal with, due to my many years' experience in the trade in various capacities, but in getting down to giving plain facts taken from this experience, I find it difficult to avoid saying some things that might cause some of my good, honest friends in the business to take exception to; however, there is an old saying that "no one will wear the shoe that does not fit," so I will "look backward."

The origin of the graphite crucible dates away back into the Sixteenth Century. They were made in Austria, and we are told that the little, old factory located in a small town called Passau is still running and is called "Vereinigte Schmelztiegelwerke." As to the real originator of the American graphite crucible, several claims have been made for this distinction, however I see very little gained in arguing this point. There are running at the present time nine plants in the United States, each and every one of them turning out a crucible with a quality second to none in the world. To make a good crucible the foundation has to begin with good raw material, and every one of these makers are buying the best and have discarded the use of the quality they used years ago. As an illustration, I have before me now a stock statement I was using as far back as 1899. This stock consisted of various grades of lump, chip and dust graphite, and amounted in total to 2,247 barrels, divided as follows: 354 barrels of lump or which there were 11 barrels 4X or good grade, the balance, 343 barrels, known as 3X (a grade no crucible maker would think of using now). Out of 542 barrels of chip there was 333 barrels never used now, and out of the 1,351 barrels of dust on hand there was only 50 barrels of a grade used now. I mention these facts because the crucible maker is constantly running up against talks like this: "Why don't you crucible makers put out the same quality of crucible you used to give us?" "Guess you are trying to get rich by using muck." "Why, ten or fifteen years ago we got pots that ran double the heats they run now," etc. With some you might as well talk to a stone fence as to try to convince them that their crucible is better than it was some years ago. In addition every maker has spent thousands of dollars with an effort to improve his methods of manufacture; in other words, advancement has been made all along the line, and there is no question but that every crucible manufacturer is putting out nothing but the highest grade possible. This fact is born out with all the large users, and the contradiction invariably comes from some little chap that will have the nerve to look you in the face and tell you he has had a 30 years' experience in the foundry, and he knows that a "scalp" is the fault of the crucible maker, or it will come many times from an unscrupulous user who has tumbled to the "rebates" or the "make good" system whereby his pots costs him little, sometimes nothing. I do not want to be understood as saying that every complaint is unwarranted, because the crucible maker is no more impervious to mistakes than any other manufacturer, but he is unfortunate in not being able to locate trouble if there has been some, because after a crucible has been in the fire three or four times no man can tell whether it ran four or forty heats. I have seen crucible that had run thirty heats and the walls were thicker at the end than at the start, so I say the maker can only stand on and listen. It quite frequently happens this way, and in order to make myself plain I will cite just one little incident that happened recently, and this is simply one incident among hundreds. Last spring I took a contract from a small user for 150 special shape and size pots. He ordered on requisition in lots of 12, and used about 150 a year. Now it requires as much time to set a machine for 12 as it does for 1,000, so we made up the entire lot of 150 and kept them in stock. Understand, that we did not have another customer who took this pot. They were all made at the same time, from the same mixing and made by the same man, burned together in the same kiln. We made him one shipment, crucibles all right, same report on second, third and fourth, then he began to kick, and it might be remarked here that he owed us for what we had sent him. Could any sane man say that the fault belonged at our door? Before I finish this article I will have many interesting incidents to relate, and I hope that it will be the means of bettering a condition that has degenerated one of the most important industries of this country.

There are two good reasons why the crucible business should be a profitable one. First, it has to carry a tremendous stock, a lot of it might be termed "dead stock," and second, because it is a hazardous, for reasons already given in not being able to locate trouble, whether it be in your shop or the foundry. Every crucible maker would welcome the tracing of the trouble to his door, because this would give him something to work from, but when he sends out thousands from the same pile, gets repeat orders specifying "quality same as last" from a dozen good customers, followed up with a "kick" coming from some little fellow, who, from force of habit has drifted into the line of "kicking" it makes life not worth the struggle. Crucible makers have paid out thousands of dollars on unjust claims, which is a no more less crime than having their pockets picked on the tail end of a trolley car, and the unfortunate part is that in spite of the efforts that are being made to produce the very best at a higher cost this guerilla warfare goes on. The present European war will undoubtedly change conditions, and it is to be hoped that the crucible fraternity will take advantage of the situation and get the business back to where it belongs, and where it once stood. Doing this will not affect the legitimate user, which, thanks, are in the great big majority, but it will allow the weeding out of a few stubbles that has made driving through the crucible pasture rough riding for the old farm wagon. Doing this at this particular time will clear the atmosphere and the captain will again handle his rudder. This war brings about a condition unparalleled, and we do not know of a time in the history of the business when our base of raw material was entirely cut off, but the fact that it greatly inconveniences both crucible maker as well as user eventually may prove a "blessing in disguise." In this issue I have tried to point out the fact that the graphite of crucible of all makes is better in every way than it was 25 years ago, and my future communications will follow up this line, together with going into their manufacture more deeply. It is a significant fact that wherever you find a "kicker" of crucibles you never find a trade paper.

(To be continued.)

* Crucible Manufacturer.

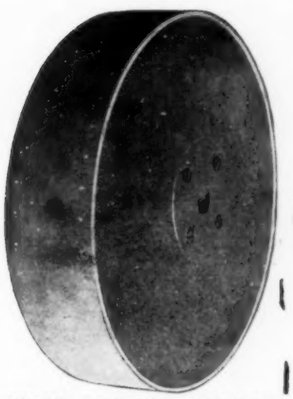
POLISHING WHEELS

AN ARTICLE, DESCRIBING THE VARIOUS VARIETIES OF WHEELS USED IN METAL FINISHING, IN TWO PARTS. PART I.

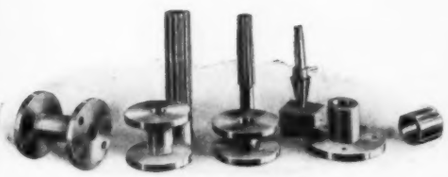
BY WALTER C. GOLD.*

It is a curious but true fact that in the last quarter century no marked or radical addition has been made in the manufacture of polishing wheels, i. e., no radical type has been introduced. There has been a decided advance, however, in the *quality* of the wheels. In the preparation of this paper, I have consulted leading manufacturers of the wheels which I will cover, but none of them can give me the name of the inventors nor even the dates when the wheels were put upon the market; therefore I shall take the matter up with the year 1890, when I became affiliated with this line of endeavor. This portion of my article deals with the wheels for coarse work, and all types of wheels written about in Part I were on the market in 1890.

VARIOUS TYPES OF POLISHING WHEELS.



WOOD, LEATHER COVERED WHEEL.



FLANGES FOR WOOD WHEELS.

VANVAS BELTING WHEEL.

STITCHED CANVAS WHEEL.

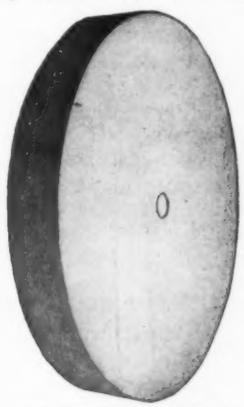
WOOD POLISHING WHEELS.

Probably the first type of grinding and polishing wheel put upon the market was the wood wheel covered with leather. The best wheels of today are made from well-seasoned selected Georgia poplar, white wood or white pine, and the grain of each section is laid at right angles, using a special glue and set under hydraulic pressure. Such wheels will not warp, a trouble frequently experienced in the early days of wood wheel manufacture. The good wheels of today are made of lumber ½, ⅝ or ⅞ inch thick, as desired by the purchaser. They are covered with heavy oak tanned leather possessing an especially skived face, which affords the best possible surface for the glue and emery to adhere. After the leather is stretched on and glued, pegs are driven in most wood wheels, although quite a number are made without the pegs, which unquestionably do aid in preventing the leather from coming off. Wood wheels are also covered with bull-neck or walrus leather; also strip felt. The wheels are balanced before shipment. Wood wheels are used for all classes of grinding and polishing, they will work well with the coarsest or the finest emery. The standard sizes are 8 inches in diameter and 1 inch wide, up to 30 inches in diameter and 6 inches wide.

CANVAS WHEELS.

This type of wheel is especially adapted for grinding and is made in three types: The solid wheel—the discs are cemented together with a special flexible cement and subjected to screw press or hydraulic pressure; the stitched—these discs are first sewed together and then the sections so formed are cemented, thereby producing a less rigid and more resilient wheel than the first named type; the open-sewed, hand-sewed only from hole to circumference. This is the most resilient wheel of all. Canvas wheels are regularly made from 6 to 18 inches

LAMINATED WOOL FELT WHEEL.



SPANISH FELT WHEEL.

BULL NECK LEATHER WHEEL.

LOOSE SHEEPSKIN WHEEL.

*Of the firm of Walter C. Gold, Philadelphia, Pa.

in diameter and ½ to 4 inches wide. The largest canvas wheel that I have seen measured 20 x 4 inches. The best wheels are made from new 6-ply canvas (very difficult to weave), which affords a "cloth-face" or one which will hold the glue and emery much longer than the practically discarded type made from old sails and wagon covers and awnings. These made a hard, non-resilient wheel which soaked up the glue and the resultant wheel was a mass of glue and canvas unworthy the name of a resilient polishing wheel. When it is stated that it takes but seven layers of resilient canvas to a 2-inch wide "New Challenge Canvas Wheel" and from 50 to 60 pieces of old sails, wagon canvas or awnings to make a wheel of equal thickness, one can readily note a great improvement in the manufacture of this type of wheel. Thus there has been a distinct gain in the canvas wheel of today.

FELT WHEELS.

A complete technical paper regarding the manufacture and uses of felt wheels appeared in THE METAL INDUSTRY for the month of May, 1914. Briefly stated, there are three qualities: Spanish, French and Mexican. These are trade names to designate the several qualities and colors. The wools used in their manufacture come, principally, from the States of Texas, Colorado, Utah, California and other Western points. The Spanish wheel is white in color, the French gray, and the Mexican a reddish brown. The Spanish wheel, which has almost entirely displaced the two others, is made from a fine grade of wool; the French from a somewhat coarser grade, and the Mexican from a still lower grade. All are produced in five degrees of hardness, viz., extra soft, soft, regular hard, hard and rock-hard. Twenty inches is the largest regular wheel, but some perfect wheels have been produced as large as 30 inches diameter and 6 inches thick. Felt wheels may be termed the "general use" wheel for grinding and polishing on all kinds of metal in all stages, although wood and canvas wheels are more generally used in coarse, hard grinding, such as agricultural implements, stove work, hardware, etc.

BULL NECK LEATHER WHEELS.

A type of wheel which is popular with certain trades, such as that of polishing stove castings, brass goods, forged tools, etc., is the bull-neck leather wheels which are made solid from full blank bull-neck leather discs cemented with an oil and waterproof cement under screw press or hydraulic pressure. They are used not only for polishing but as an "oil wheel," or "grease wheel," for securing a fine finish. They may be turned off to any shape of face in order to conform to the work.

PAPER POLISHING WHEELS.

This style of wheel is made in two types—the strawboard paper wheel for rough work, such as steel castings, plows, agricultural implements and sheet metals and the felt paper wheel, which has a slightly yielding surface for finishing grates, mantels, stove trimmings and all flat metal surfaces. These wheels are made from discs of strawboard and felt paper glued and set under hydraulic pressure. The face may be turned to any desired shape.

THE "COMPRESS" WHEEL.

Previous to 1890 the Compress Wheel Company, then proprietors of the "Compress" patent, put upon the market the "Compress" type of wheel. This wheel consists of two metal plates, the inner sides of which are grooved at the periphery. Into these grooves are set the died-out pieces of leather, canvas, felt or paper—in other words, the component parts of the wheels are set on edge, as it were, in one-inch and two-inch cushions. The faces can be turned to fit the shape of the article being ground. It can be readily seen that these wheels with their thick cushions will last a long time, and while more expensive in first cost than other wheels, it can be safely asserted that they are well worth the difference in price. In view of the fact that the wheels can be supplied in leather, canvas, paper and felt, and of different degrees of density, or hardness, they may be used for a great many purposes. Notwithstanding the fact that they are built with iron centres the wheels are resilient, especially in the 2-inch thick cushion type and, if properly set up, will not "chatter." Again, they may be used for all classes of work—grinding, polishing and for "oil finishing."

(To be continued.)

VARIOUS TYPES OF POLISHING WHEELS.

HAND-SEWED SHEEPSKIN WHEEL.

PAPER WHEEL.

PRINTERS' INK WHEEL.

LACK OF ORDERS FOR ALUMINUM GOODS IN JAPAN.

Manufacturers of aluminum goods are reported to be suffering considerably on account of the war. The raw materials were imported from the United States and Australia, and to these lead and other needed metals were added. Flower vases, other ornamental articles, and utensils for daily use were made and exported to Europe, America and Australia. Since the war the prices of raw materials have advanced 30 to 40 per cent., and there have been practically no orders from the United States, whereas ordinarily this is the busiest season of the year.

METAL COLORING BY THE CORROSION PROCESS

The Application of New Methods in Oxidizing Iron and Steel Articles.

By Emmanuel Blassett, Jr.*

A notable progress has been made in the last few years in nearly all branches of plating and metal coloring, and many new processes have been discovered, that have proved of great industrial value. Probably the greatest achievement is the discovery of the deposition of metallic oxides, by Rojas. The many durable and artistic finishes produced by the Rojas process, and the economical and rapid manner in which they are obtained is truly remarkable. The art of metallization of non-metallic objects has developed to such a point that the most delicate flowers and articles of wood, cloth or other material may be readily metallized and made imperishable. The production of silver deposit work on glass has also grown into a great industry. In other branches we find the perfection of the Bower-Barff process, which renders iron and steel highly resistant to the corrosive action of the atmosphere. Coslettizing has also proved a simple and efficacious process for rust-proofing iron and steel. Another advanced step in rust-proofing is the new process of coating iron and steel with carbon, known as the Carbonium process. No details of this method have yet been published.

With the rapid and extensive development of electro-galvanizing, there has also been discovered several other valuable processes, for obtaining zinc deposits; such as sherardizing, in which the zinc coating is obtained by heating the article in the presence of zinc dust, and vapor galvanizing in which zinc is deposited in the form of vapor. In the latest electrolytic process for rust-proofing iron and steel, zinc is deposited first, followed by a coating of lead. This is known as the zi-lead process, and is claimed to be superior in rust-proof qualities than a simple coating of zinc, as in electro-galvanizing. An improvement in the old process of hot galvanizing has also been made. This new method is called Lohmannizing, named after the inventor, Mr. Lohmann, who claims to obtain a more homogenous and protective coating of zinc, principally by the preliminary treatment of the work.

We also note the two processes of coating metal by "frictional precipitation" of which much was expected at first. Galvanite, the first process to appear, has not made any industrial progress. When Voltite first came out, it was heralded as a revolutionary change in the art of metal deposition, and many platers feared that solutions would be discarded. Voltite does not appear to have a wide industrial application. It should prove useful in applying metallic coatings to etched surfaces, where there would be a danger of removing the "resisting coat," if the article were immersed in alkaline solutions. It could also be used, in some instances, for sectional plating. Obtaining metallic coatings by "frictional precipitation" is not new, and silver and gold have been deposited in this manner for many years, principally in connection with finishing etched goods. The Voltite process, however, is a decided improvement, as heavier deposits are obtained than those produced by the old formulas.

The introduction of specially prepared plating salts is a decided advance over the old methods of preparing solutions. Attempts have been made to use fused electrolytes for deposition, and also the spraying in a molten condition of the metal to be deposited. These processes are a possibility of future development.

Improvements have been made in all branches of plating and metal coloring with the possible exception of

*E. Blassett and Company, Burlington, Vt.

OXIDIZING IRON AND STEEL ARTICLES BY THE CORROSION PROCESS.

The treating of copper, brass and bronze goods by corrosion is extensively practiced and many artistic and durable finishes are produced. The production of many beautiful effects in verd antique, and the black used on telephones, opera glasses, and other articles are examples of the corrosion of non-ferrous metals. Copper and its alloys are more readily corroded than steel or iron, and for that reason considerable success has been achieved in producing suitable finishes. The production of oxides on steel and iron by the corrosion process is but little practiced, and this field of metal coloring has been left undeveloped. One or two writers have called attention to the term "oxidizing" as the process of finishing copper, silver and other metals is termed. As oxygen does not enter in the production of the finish, the term "oxidizing" should be inapplicable, when metals are treated with potassium sulphide, to produce the well-known finishes of "oxidized" silver or "oxidized" copper. The term "oxidizing," however, has been used so long and is so deep rooted, that it will probably always be used in connection with these finishes. The term "oxidizing" is more correctly applied to finishes in which oxygen plays a part, as in the well-known black produced on gun barrels and revolvers, or the Bower-Barff process. In these finishes the black oxide of iron is formed, and it would be quite proper to call it an oxidized finish.

It is not always desirable or practical to use dips or depositing solutions to finish iron and steel articles. In some instances the work on hand does not warrant the installation of solutions and dynamo, and the employment of skilled labor. Or the pieces to be treated may be too long or bulky, and for these reasons the corrosion process many prove useful. The metallic oxides constitute a large variety of colors. Some of these colors may be readily produced by corrosion, when suitable solutions are applied to the article to be treated. As the surface of the metal is slightly attacked, the finish produced is very durable, and cannot by any possibility "peel," which is apt to occur in plating. The conditions of the atmosphere in which the corrosion is carried out is an important factor in producing the desired results. To obtain the desired finish, suitable chambers, kept in a moist or warm condition, are often employed. In this manner the writer has succeeded in producing several oxidized finishes that are both durable and ornamental. In addition to this, the finish, to a great extent, protects the article from rusting when exposed to the air. Oxidized finishes of this nature are not usually lacquered. It is preferable to oil the article with linseed or paraffine oil, or a mixture of the two. One great advantage in using this process is the simplicity and economy of operation, and no special experience is required. It is not claimed that finishing steel and iron by the corrosion process is new. On the contrary, it has been practiced to a limited extent for many years, and the process is older than electroplating. It has, however, remained undeveloped and its usefulness has not been fully appreciated. There are possibilities of producing many artistic and durable finishes on iron and steel articles by this method. Swiss watches, steel scales, for pocket knives and a large variety of steel novelty work, finished in the black oxide of iron, is imported from Europe. This finish is produced by corrosion, and is generally known as the gun metal finish here.

THE INFLUENCE OF STYLE ON THE ART METAL WORK OF MODERN TIMES

A Continuation of a Series of Articles on This Interesting Subject.

By A. F. Saunders.*

THE AMERICAN COLONIAL.

It would seem that in a country so cosmopolitan in its make up as the United States of America, a nation though comparatively young, yet so intensely progressive, should have developed a truly characteristic art style, yet the nearest approach to a real American style is found in the so-called Colonial of our great-grandfather's time.

While in general character the Colonial but reflects the spirit of the English Georgian period, it in many ways possesses features of its own and is most worthy of being called a great style.

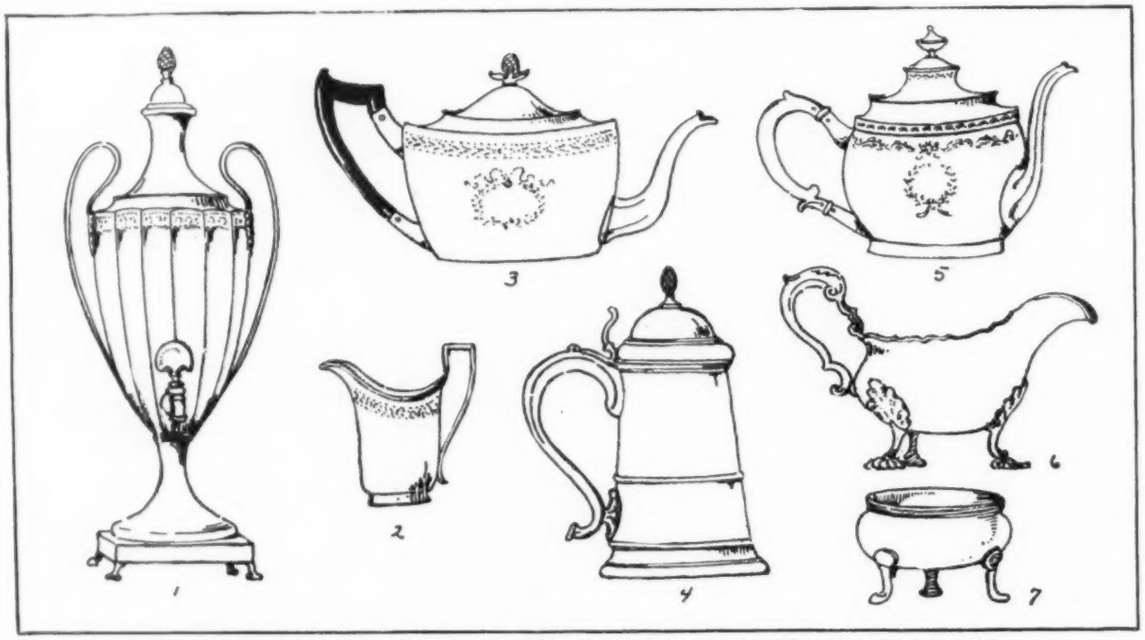
Its principal difference from the Georgian and what is considered its greatest charm is its simplicity, its chaste outline, and above all its beauty of proportion. The structural outlines of the Colonial style whether of building or of small object are clear cut, simple and consistent, based upon the pure classic principles so well loved by the founder of the Georgian. That it should be a style simple in character is but natural, as life in America during Colonial times was far too serious a matter to permit the indulgence of ideas not closely related to the necessary and the practical. No style is better suited to our American homes of today then the Colonial, it seems, and is, so distinctively ours, so homelike, so refined, so dear through tradition and association, so like our domestic ideals and republican institutions, the very personification of dignity and refinement.

As a style the Colonial reached its perfection between the year 1750 and about 1820. In the metal work of the period form and outline were the paramount features, the simple decorative motifs used were usually engraved, or flat-chased, though low repousse chasing (raised from the back) was not uncommon, saw piercing of simple design, were used as in handles of porringers, the outer edges of small trays and dishes.

Simple borders such as the ogee, the reed or thread, the gadroon, flutings of various kinds, the festoon and swag, the wreath, the laurel and oak leaf, simple shield effects with a limited amount of simple floral or scroll forms made up the chief characteristic motifs of ornament used.

As compared with the elaborate silverware made in the mother country at that period, the work of our Colonial craftsmen appears modest indeed, but this very lack of any effect of showiness, this very simplicity carried with it a certain severe yet classic beauty which could not be surpassed.

The early manifestations of Colonial art, as we might expect, were chiefly religious, such articles for church use as the flagon, the beaker, chalice, alms basins and other utensils required the skill of a silversmith in their fashioning. It should be remembered that very few families could afford the luxury of table silver, complete tea services were almost unknown, the possession of a single tea or coffee pot, or perhaps a sugar and cream with a few spoons and forks represented the usual amount of silverware owned by a well to do family.



COLONIAL SILVER—TYPICAL SILVERWARE MADE BY EARLY AMERICAN CRAFTSMEN.
Nos. 1, 3, 4, 6, 7 by Paul Revere, 1774. No. 2, John Cony, 1700. No. 3, William G. Forbes. 1773.

Of the Colonial silversmiths the name of Revere stands out most prominent, not alone because it is connected with the military history of our country but because both the elder and younger Reveres were craftsmen of skill and resource. Examples of their work, handed down to us, bear convincing testimony of their excellent ability.

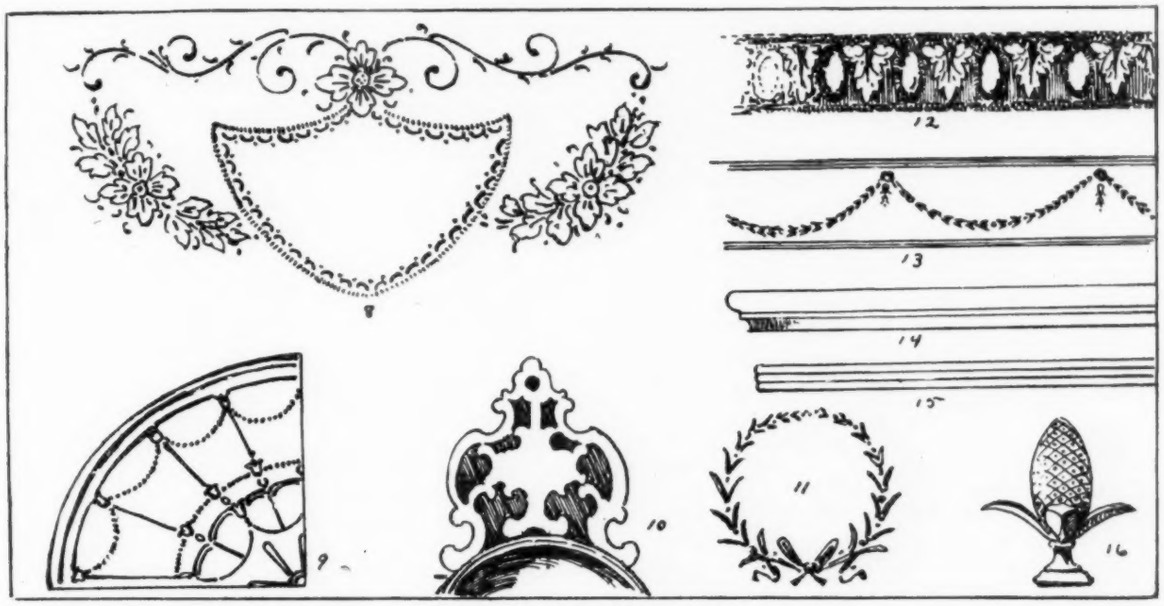
With the passing of the Colonial period and our development into a mighty nation, we come to a period of meaningless decoration which characterized almost the whole of the nineteenth century. This has been due in part to a concentration in the great development of mechanical processes. Art has been more or less lost sight of, but with the opening of the present century a certain reaction has taken place. Art is being studied more then ever before, the arts and crafts movement is one evidence of this awakening, the so-called L'Art-

*Designer, Benedict Manufacturing Company, East Syracuse, N. Y.

Nouveau, another manifestation of the ever growing desire to create, to break away from worn out traditions. The next article of this series will take up this new art movement.

In ending this article I might say that there is much to be said of the good done by the apparent desire, though it may seem but a passing fad, to revive the "handicrafts." It has at least opened our eyes again to the need of beauty in the practical details of life. It is helping us to appreciate the fact that simple things can possess true beauty, and that what we need for our homes are fittings suited to our present lives, this spirit should apply to the work and art of the metal craftsman most sincerely.

(To be continued.)



COLONIAL DECORATIVE MOTIFS.

No. 8, Engraved Shield and Festoon; No. 9, Leaded Glass; No. 10, Saw Pierced Porringer Handle; No. 11, Flat Chased Wreath; Nos. 12 and 13, Engraved Borders; No. 14, Ogee Border; No. 15, Reed Border; No. 16, Tip, Used on Tea Pots, Pineapple Motif.

RAPID WORKING METHODS IN A BRASS MANUFACTURING PLANT

By P. W. Blair.*

Up-to-date and improved methods of doing work rapidly in a brass manufacturing plant is made possible by the introduction of improved tools and special machinery. These items save time and are more and more coming into use. The day has gone by when hand tools for machine work or hand turning, such as a monkey wrench and file were used at the bench. They are now supplanted by a special machine or miller to make a cut and a special wrench for the different sizes.

At the present time we hear a great deal about improved methods as if the term was of recent coinage or that a limit had been reached and no further progress towards improvement was possible. The fact is nearly all methods of work production relating to brass manufacturing practice were at one time improved methods, no matter how old and antiquated they may now be. Therefore, to increase output or to extend the present limit of production without any special effort in speeding on the part of the machine operator, it is still possible to further improve the present methods in use. This is possible only by the introduction of special tools and special machinery to supplant the ones now in use.

The reason why some manufacturers are slow to change or grasp the opportunity is because of their failure to see where they can improve upon existing methods of doing work. In many large shops there are still used the slow method of putting screws in articles by the bench hands with a common screw driver. Whereas a bit holder containing a screw driver blade would send the screw down rapidly and bind it tightly in the work. Or using a screw inserting machine, which automatically feeds and inserts the screws. It is these little and often unnoticed things that hold back production. When tools are required to be picked up and laid down continuously means just so much more added to the cost of producing the work.

Jigs and air equipment have played an important part in rapid production and quality of work, but the possibilities of further improvement along this line is unlimited. It is by the study of these details that larger productive methods are made possible. The first cost of drawings and patterns should not be considered when production in manufacture can be often increased just with a slight change in the design of the article without decreasing the symmetrical appearance of the article, thereby reducing the cost in foundry or polishing departments.

It is where the work itself is being produced, either at the bench or machine, that the methods of operation and handling should be given the undivided attention of those in charge. In all working operations from the foundry to the shipping departments; from the taking of a piece of work from a box or blowing off a mold to the final application of putting it in the plating tank, there is always a better way in which these things can be done, and the better way means most always a quicker and cheaper way.

In order to further production, every detail in con-

*Superintendent Brass Finishing Department, H. Mueller Manufacturing Company, Sarnia, Ont., Canada.

nection with any particular operation must also be given careful study even down to the smallest and most insignificant item. To notice how the operator stands up to his work, whether he has a piece ready to put in where a finished piece is taken out, whether he picks up a shovel or wrench slovenly are a few of the many minor points to be looked into in order to lessen the increased cost of labor and to increase production.

THE TESTING OF ELECTRO-PLATING SOLUTIONS

A Description of a Simple Method for Maintaining an Acid Copper Bath.

The following information is embodied in a circular issued by the Bureau of Standards, Washington, D. C., devoted to the testing of acid, copper, electroplating solutions. The work was done by the bureau in order to produce a standard method of testing an electrotyper's copper bath. The information given, however, will apply equally well for an acid copper solution used by a plater and will thus form a good basis for the formulation of standards for all solutions. The present circular is not intended to convey specific recommendations, but merely gives a description of a simple apparatus and method for determining and maintaining constant the composition of the solutions.

REGULATIONS OF COPPER SOLUTIONS.

The solutions in general use contain in addition to water only copper sulphate and sulphuric acid; and since these substances and also the anode copper as purchased are usually fairly pure, there is no marked tendency for impurities to accumulate in the solution. The mere determination of the density (or specific gravity) of such solutions is not sufficient to control their composition; but if this is accompanied by a determination of the free sulphuric acid present, all the data necessary for maintaining a nearly constant composition are available. In various plants the specific gravity ranges from 1.120 to 1.200, and the acidity from 25 to 75 grams per liter. For uniform operation the solutions should be adjusted at regular intervals, e. g., once a week.

SPECIFIC GRAVITY (DENSITY).

Before testing the solutions, they should always be adjusted to the normal level in the vats by the addition of water if necessary. For testing the density of the solutions the use of a specific gravity hydrometer is recommended rather than a Baumé hydrometer. Degrees Baumé may be converted to specific gravity and vice versa by means of the following tables, which are given in more complete form in Circular 19 of the Bureau of Standards:

Sp. gr.	Deg. Bé.	Sp. gr.	Deg. Bé.	Deg. Bé.	Sp. gr.	Deg. Bé.	Sp. gr.
1.00	0.00	1.11	14.37	0	1.000	13	1.098
1.01	1.44	1.12	15.54	1	1.007	14	1.107
1.02	2.84	1.13	16.68	2	1.014	15	1.115
1.03	4.22	1.14	17.81	3	1.021	16	1.124
1.04	5.58	1.15	18.91	4	1.028	17	1.133
1.05	6.90	1.16	20.00	5	1.036	18	1.142
1.06	8.21	1.17	21.07	6	1.043	19	1.151
1.07	9.49	1.18	22.12	7	1.051	20	1.160
1.08	10.74	1.19	23.15	8	1.058	21	1.169
1.09	11.97	1.20	24.17	9	1.066	22	1.179
1.10	13.18	1.21	25.17	10	1.074	23	1.189
				11	1.082	24	1.198
				12	1.090	25	1.208

Having determined the specific gravity of the solution, adjust it to the desired specific gravity as follows: Divide the difference between the observed and desired specific gravities by the difference between the observed specific gravity and the specific gravity of water, which is 1.000. The result is the per cent. of the solution which should be replaced with water. Thus, for example:

Observed sp. g.....	1.171	Observed sp. g.....	1.171
Desired sp. g.....	1.150	Sp. g. of water.....	1.000
Difference	0.021		0.171

Since $\frac{0.021}{0.171}$ or $\frac{21}{171} = 12.3\%$, replace with water 12 gallons of the solution for each 100 gallons in the vat.

Note.—The solutions should always be tested and corrected at room temperature (e. g., after standing over night), since the specific gravity is influenced by the temperature.

TITRATION OF ACID.

The apparatus and solutions necessary to test the acidity can probably be secured from some local chemist at a moderate charge. The drawing illustrates a form of apparatus that has been found convenient. Many other forms of automatic burettes are equally suitable, and in some cases will probably be more convenient to obtain. Similarly solutions of other strength than here recommended can be used, provided the calculations are correspondingly changed.

SOLUTIONS.

(a) Sodium hydroxide (alkali) solution to neutralize the acid. This solution is prepared of such strength that one cubic centimeter (1 cc.) will neutralize 0.03 grams of sulphuric acid (i. e., it is 0.61 normal). If therefore a sample of 10 cc. (or 1/100 of a liter) of the copper sulphate solution be titrated, each cc. of the sodium hydroxide required is equivalent to 3.0 grams per liter of sulphuric acid.

(b) Methyl orange solution (1 part methyl orange in 5,000 parts water) which serves as an indicator, i. e., it changes color when all the sulphuric acid is neutralized.

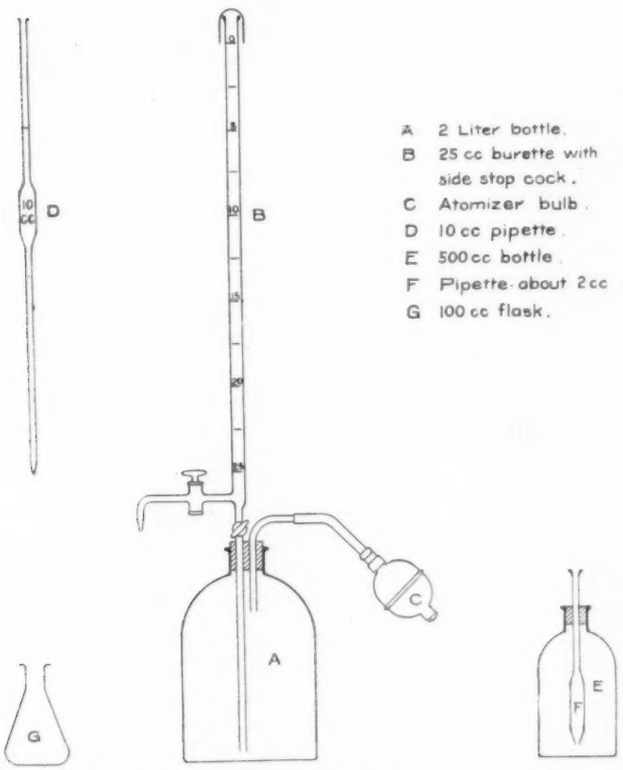
TITRATION.

To carry out the titration, measure with a pipette 10 cc. of the copper sulphate solution to be tested (after the bath has been adjusted to the desired specific gravity and thoroughly mixed), and run it into a small flask. Add to it about 2 cc. of the methyl orange solution. To adjust the sodium hydroxide solution to the zero mark in the burette turn the center stopcock so that the burette is connected with the stock bottle, and with the bulb pump the solution till it is above the zero mark, and then shut off this stopcock. Next turn the side stopcock and allow the solution to run into any convenient vessel (for waste) till all air is displaced from the side tube and the lower edge of the curved surface of the liquid is just at the zero mark. Now run the sodium hydroxide solution into the copper sulphate solution slowly with constant shaking, until the violet color of the solution just disappears. If a decided green color, or appreciable precipitate appears, too much alkali has been added and a new portion should be titrated. Note the posi-

tion of the lower edge of the curve at the end of the titration.

CALCULATION.

To find the number of grams per liter of sulphuric acid in the copper solution, multiply by three, the number of cc. of alkali used in the above titration. To find the number of pounds of acid to be added for each 100 gallons in the bath, deduct the amount of sulphuric acid thus found, from the prescribed content, and multiply the result by 0.85. (Since one gallon is equal to 3.78 liters, or 100 gallons equal 378 liters, we multiply by 378 the number of grams per liter required; and since there are 454 grams in one pound, we divide the last result by 454. For practical purposes, therefore, we multiply by $\frac{378}{454}$ or 0.85.) For any given capacity of tank, the correct factor can be readily determined.



APPARATUS USED FOR TESTING PLATING SOLUTIONS.

EXAMPLE.

Suppose 10 cc. of the copper solution requires 14 cc. of the alkali in the titration. Then the solution contains $14 \times 3 = 42$ grams per liter of acid. If, for example, we desire to have present 50 grams per liter, it is necessary to add $50 - 42 = 8$ grams per liter. For a vat holding 100 gallons, we must add 8×0.85 or 6.8 lbs. of acid, or in round numbers 7 lbs. Or if the vat holds, for instance, 180 gallons we use the factor $\frac{180}{100} \times .85 = 1.53$; i. e., we must add 8×1.53 or 12.2 lbs. of acid.

NOTES.

1. No recommendation is made as to the best acid content, for any given conditions. In general the lower the voltage used, the more acid is required in the bath to produce a given current strength, and vice versa. For the present, each operator should find a composition of solution which gives satisfactory results under his conditions, and maintain it by the above procedure.

2. To determine the approximate capacity of the vats in gallons, divide the cubical contents in cubic inches (to the height of the solution) by 231.

3. To convert grams per liter to ounces (avoirdupois) per gallon (U. S. liquid), multiply by 0.134; or divide by 7.5. Thus 50 grams per liter = 6.7 ounces per gallon. To convert grams per liter to per cent. by weight, divide the grams per liter by ten times the specific gravity of the solution. Thus for a solution with a specific gravity of 1.15, 50 grams per liter is equivalent to

$$\frac{50}{10 \times 1.15} = \frac{50}{11.5} = 4.5\%.$$

4. After completing titration, allow the burette to empty and put a little vaseline on the stopcocks.

5. Keep a permanent record of all titrations and of all changes in or additions to the solutions, together with an approximate record of the amount of work turned out (in square inches or in pounds of copper). Such a record will be valuable, not alone to the operator, but also in furnishing information of general interest regarding the operation of such baths.

ALUMINUM CONDITIONS.

REVIEW OF THE YEAR.

The year 1914 has been termed a colorless one in aluminum circles. No items of interest seem to have taken place in the industry.

In the latter part of 1913 the aluminum business slumped in common with all other lines of industry in this country, although prior to that business had been unusually brisk. This slump has continued in the aluminum industry the same as it has in most other industries. There were some slight signs of recovery but they were promptly dissipated at the breaking out of the war. Naturally the depressed busness conditions have resulted in the accumulation of a very heavy stock of aluminum and have discouraged producers from embarking in any new enterprises.

Aluminum foil, which hitherto had been imported, is now being manufactured here and is meeting with considerable success, which is gratifying to those engaged in the trade in the United States. Perhaps the greatest advance made in 1914 by aluminum has been in the quality of sheet produced. Aluminum sheet has a tendency to have blisters and other surface defects, but special efforts have been made to study the cause and remedies for such defects and these efforts have been so far successful that the sheet on the market today is of very superior quality.

PROSPECTS FOR 1915.

The influence of the war upon all lines of industry makes it very difficult to foresee the future. If it is assumed that the war will continue in substantially the same deadlocked condition that it has maintained during the last two months, it seems as though the business for 1915 must be substantially a repetition of 1914. No improvement at least could be looked for.

CARE OF CRUCIBLES.

To avoid loss from the possible breaking of crucibles while melting bullion it is advisable to use two crucibles, one within the other, the inner one of the Battersea make and the outer of graphite. Both crucibles should be well tempered before the melting heat is applied.

EDITORIAL

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Vol. 21. No. 1.

NEW YORK, JANUARY, 1915.

NEW SERIES
Vol. 13. No. 1.

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CONTENTS

THE METAL INDUSTRY FOR 1915

With this issue THE METAL INDUSTRY begins the thirteenth year of its life and it is perhaps appropriate to say a few words as to the aims of this paper for the coming year. We think that our readers will agree with us when we say that the *quality* of the reading matter published in 1914 has been quite up to the standard set by preceding years, even though the *quantity* may have been a little less. After all it is quality that counts, and we have tried to score another hit in the center of the target, i. e., readers' attention, with this issue. A brief resume will give the reader an idea of what is presented in the current number:

First, there is a well-written description of the methods employed in operating to the best advantage the large plating room of the National Cash Register Company at Dayton, Ohio. This article should furnish a great many ideas that other plating plants, large and small, will find worth while adopting. Our well-known author and athlete, Wm. H. Parry, begins one of his characteristic articles, which we are pleased to say will probably be continued for several issues. Mr. Parry has a style all his own —natural, easy and semi-humorous, yet he gives the facts and drives home his points with sledge-hammer emphasis, and the article in this issue on Brass Foundry Equipment and Management is no exception to his rule. There is an interesting description of Etching by the Transfer Process as used by an etching expert, John R. Baynes, of Vineland, N. J., and we are assured that no similar description has been published before. Mr. Johnathan Bartley, one of the best known, if not *the best*, crucible makers in the country, has consented to arrest for a few hours his forward march and reminisce back upwards of twenty years. We are very glad to present Mr. Bartley's article on Crucible Manufacture, the first installment of which begins in this issue. As it is really the first history of the crucible business that has been attempted, we are sure that it will interest any one whoever has had or will have occasion to use a crucible.

Emmanuel Blassett, Jr., an author of long standing, favors us with a well put together account of the various methods of Metal Coloring by the Corrosive Process. A. F. Saunders, the well-known designer, has another of his interesting discourses on style and this one, The Influence of Style on the Art Metal Work of Modern Times, is fully up to the usual standard. The above articles give a good idea of what is offered in this January number of THE METAL INDUSTRY, and we put it forth as an example of what we hope to furnish throughout the year.

RETROSPECTIVE REVIEW OF 1914—OUTLOOK FOR 1915

A Brief Report of Business Conditions Existing in the Metal Industries for the Past Year and Prospects for 1915.

The first part of the year 1914 opened with what seemed to be a fair promise of better business all around. But for some unexplained cause the wheels of industry did not turn with the increasing speed that everybody looked for. Progress was made in a great many lines, but only in a halting hesitating way that betokened a lack of confidence. This condition continued with now and then a fitful flash of better business until well into the summer, when in August came the outbreak of the European war which involved practically the whole of the Eastern Hemisphere. As a direct result of this war, which seemed to be totally unnecessary, business conditions in the United States became practically stagnant. The stock exchanges in the large cities, considered to be the barometers of trade, were closed, banks called in loans and reduced lines of credit, concerns large and small immediately retrenched in their operations and import and export business fell away to almost nothing. The summer waned and fall came on, but the war still continued resolving itself into an artillery duel, with neither side gaining any very notable advantage. This state of affairs has caused a sort of reaction on this side of the water and signs are now in evidence that business confidence will soon be restored. The stock exchanges have opened, the Federal Reserve Law has been passed and the railroads have been granted a freight rate increase. Already there is a perceptible picking up in a great many lines based on the number of inquiries being received. In reading the reports from the various industrial centers published under the head of Trade News in this issue of The Metal Industry, the optimistic side will be observed to be taken by most of the writers.

Much has been said in the daily press about the benefits to be derived in this country by furnishing machinery and materials to the warring nations. These products may be divided into two classes, those needed in warfare and those essential to everyday life such as clothing and foodstuffs. Now while some concerns here may have filled to advantage large orders for war materials and machinery, what advantage has accrued from the boosting of the price of wheat to the two dollar a bushel basis because a large quantity is shipped abroad? The direct effect of such proceedings is to increase the already too high cost of living, for with high foodstuffs the tendency is of course for higher domestic prices. So looking at the situation from a broad point of view, with the idea of benefiting the greatest number, the sooner the war is over the sooner will industrial conditions turn back to a normal basis.

MANUFACTURING ACTIVITIES.

Among the manufacturing interests the things which have received the most attention during 1914 have been the further development of scientific management and the furthering of the "safety first" idea. Some large concerns, notably the General Electric Company, Schenectady, N. Y., and the Pullman Company, Chicago, Ill., have published an account of what they are doing for the benefit of their employees. Two interesting papers on this subject were read at the Foundrymen's Convention at Chicago, Ill., in September. One of these by Fred Moerl, of the Pullman Company, was published in the November issue of The Metal Industry. There is no doubt now that the "safety first" movement once started has taken hold of employer and employee alike and a greatly reduced casuality list will be the result of the interest shown in the conservation of human life. With this phase of industrial activity well in hand, the next big problem to take the attention of the manufacturer will undoubtedly be the fire hazard. The destruction by fire of the plant of the Edison Company, at East Orange, N. J., with a loss of three million dollars, to say nothing of the throwing out of employment of hundreds of people, will probably act as a great incentive for the design and adoption of more efficient fire preventive measures.

The record for 1914 in new machines, processes, etc., does not contain anything very startling. There has been the usual number of patents granted; a total of 124 has been noted in the columns of The Metal Industry for the year, against 127 for 1913. These, as in the year previous, include alloy mixtures with 11 patents, and furnaces of various types with 9 patents. Probably the most important production during the year in the way of a machine was the Mellen rod casting machine of the Continuous Casting Corporation, Newark, N. J., described in the October issue of The Metal Industry. This machine produces a rod of wrought brass of such shape that it can be taken directly to the "bull block" and from there on to the draw benches. This eliminates the following steps of the old method of making rods and wire: 1, Cost of casting wire bar; 2, Cost of handling wire bar from molds; 3, Cost of rehandling the wire bar to and from annealing furnace; 4, Cost of reheating; 5, Cost of rolling at rod mill, and 6, The consequential cost by way of loss from oxide scaling during heating and rolling operations. Another very important machine brought out in 1914 was the mechanical plating machine patented in August, 1914, by Hanson and Van Winkle Company, Newark, N. J. This machine, described in The Metal Industry for November, was designed to automatically plate thousands of articles by mechanically conveying them from one end of a tank to the other. Another advance made in the electroplating industry is the growing tendency among platers to use the cyanides of the metals as prepared by the manufacturer rather than for the plater to make the combination himself. As, for instance, when the plater wishes to make up a solution of copper cyanide, he adds potassium cyanide to a solution of copper carbonate he produces, it is said, copper cyanide and potassium sulphate and carbonate due to the impuri-

ties in the carbonate. Now by using the copper cyanide which the manufacturer has, by reason of a new process perfected during the year, placed at his disposal at a reasonable price, he is able to get a chemically pure bath and saves time and money. These metal cyanide salts are described in the December issue of THE METAL INDUSTRY.

OUTLOOK FOR 1915.

The prospects for any great revival in business in 1915 cannot be said to be very bright. The same unrest so noticeable throughout the year 1914 is still in evidence and about all any one can do is to steer a straight course ahead and do only a safe and sane business and take no speculative chances. The duration of the war is problematical, but any way we are beginning to believe that the war's effects are already being discounted and the natural "march on" spirit of the country will bring about a return to ordinary conditions. The signs point to this and we sincerely hope that the signs will come true.

CORRESPONDENCE

WE CORDIALLY INVITE READERS' OPINIONS AND CRITICISMS OF ARTICLES PUBLISHED IN THE METAL INDUSTRY

BRASS IN ENGINEERING ALLOYS

TO THE EDITOR OF THE METAL INDUSTRY:

I have read with great interest Mr. Alfred D. Flynn's paper* on the failure of manganese bronze, especially in the form of rods. He also refers to other metals which have failed in a similar way. I can only say that we do not have such wholesale failures this side of the Atlantic Ocean. I agree entirely with the views of Mr. W. P. Smith and Mr. N. H. Schwenk as given in their letters in the December number. There is a right and a wrong way of making manganese bronze rods. It is a complicated alloy, usually with six constituents, all of which are essential for some property or other.

If it is cast too hot in the original billets, or is cast dirty, it will fail in the final processes or, worse still, when in use. If it is rolled at too high a temperature it will go wrong, if it is finished off at too low a temperature it will go wrong. If it is drawn cold too much to get high strength, the small cracks will develop. The correct way of making this alloy and avoiding all these pitfalls is gained by practical experience and when once gained the metal will not fail.

In England our manganese bronze rods contain a much higher proportion of manganese than iron, whereas I understand that in America the reverse is the case. Another difference is that English spelters, the best brands, are free from cadmium and American spelters frequently contain this element. I am not going to say that it is injurious for brass making, in fact, I do not think it is, but I will not go so far as to say that it is not injurious to manganese bronze.

The purest metals obtainable must be used to obtain the best results with manganese bronze.

With regard to the mercury test I should like to say that in my opinion it is valueless and ought to be abandoned. Everybody knows how gold, for instance, is attacked by mercury and its salts and to suggest that an alloy should be tested by putting it in a solution of mercury or in mercury itself, one of the most corrosive to other metals known, is to my mind very unscientific. It is better from an engineer's point of view to have a metal with a lower tensile strength and a greater elongation, than a very high tensile strength and a small elongation; under these latter circumstances internal strains are set up.

One gets similar cases with condenser tubes. I have known cases where tubes have passed chemical and mechanical tests and have stood in a shipbuilder's yard a few months and when they have been required for use, a considerable percentage of them have been found to be cracked.

ERNEST A. LEWIS.

Birmingham, England, December 24, 1914.

*THE METAL INDUSTRY, December, 1914.

TO THE EDITOR OF THE METAL INDUSTRY:

Mr. Alfred Flinn's article, "Brass in Engineering Construction," which appeared in your December, 1914, issue, has attracted our attention. If we understand Mr. Flinn, his data and deductions apply to "rolled" or "forged" manganese bronze, and not to sand-cast material, machined, but not otherwise forged, shaped or heat treated. We raise this point, as we have been making manganese bronze "castings" for the leading automobile builders of the country for several years, under a specification calling for 75,000 pounds tensile strength, 25 per cent. elongation, etc. We furnish many of the valve stems used by the Board of Water Supply, City of New York, and a very large tonnage to the Isthmian Canal Commission during the construction of the lock gates at the Panama Canal. All these parts were "sand cast." We have had no complaints beyond those due to minor imperfections caused by "molding"; defective "metal" has not been brought to our attention.

We take the liberty of raising this point, as we do not believe that Mr. Flinn intends to condemn "metal," *per se*: he aims, we believe, to point out the difficulties encountered in forging, or otherwise shaping it, for certain specific purposes. It would not be possible to condemn manganese bronze because some of it has failed to forge. Perhaps it will not forge; we cannot state from our own experience that it will. We assert that it can be successfully sand cast.

WM. H. BARR,
President Lumen Bearing Company,

Buffalo, N. Y., January 4, 1915.

TO THE EDITOR OF THE METAL INDUSTRY:

In regard to the article appearing in your December, 1914, issue regarding the failure of bronzes in the Catskill Aqueduct, I do not wish to enter into a controversy with the parties, but since reading the articles have looked up the records here and have also found some old bronzes, Tobin bronze, Seymour bronze, manganese bronze, which I have been assured have lain in the racks for something over ten years, and these bronzes show no aging cracks and seem to be in perfect condition. They show a tensile strength equal to that of the bronze made today. I thoroughly agree with the metallurgist of the Wm. Cramp & Sons Ship and Engine Building Company, in that bronzes, if not very carefully made, and from the best materials, are liable to deteriorate. This has been shown very clearly by our English brothers, and I think it has been conclusively proven that if the metal is well worked it does not have this aging trouble.

WM. W. CLARKE,
Metallurgist.

Seymour Manufacturing Company, Seymour, Conn., December 12, 1914.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS THE METAL INDUSTRY.

CASTING

Q.—We are using brass scrap to melt into gas cocks that have to submit to a 6-inch water pressure test. We find the castings are more or less porous in spots, and leak. Can you suggest a remedy?

A.—Gas cocks leaking under 6-inch water pressure is very often caused by aluminum getting in the metal when scrap metal is used. Where castings are subject to water pressure any aluminum, no matter how small the quantity, will cause porous castings. The gating of this class of castings sometimes causes leaks. The gate should be on the pipe end, and when poured on the flat should be large enough that the castings will cool before the gate. I would advise that owing to the difference in price of scrap and ingot brass being so small that I would avoid any possibility of getting any aluminum by using brass ingot free from aluminum.—W. J. R. Problem 2,080.

CUTTING

Q.—When should low cutting speeds be used on brass work that has to be kept to a very close limit.

A.—While it is most desirable to work up to the limit in cutting brass in the lathe it is not in all cases advisable. With a single pointed turning tool that may be quickly and easily sharpened, it is desirable to run the speed to the limit.

In the case of special tools intended to perform certain finishing operations and when the accuracy of the piece depends to some extent on the action of the special tool, than that tool should be handled by using lower cutting speeds. For example take a reamer that is used to finish holes smooth and true to an exact diameter within a thousandth of an inch. Such a tool should be handled with care and the cutting speed sacrificed for the sake of maintaining the cutting edge. Care and judgment must also be exercised in each case to get the best results.—P. W. B. Problem 2,081.

FINISHING

Q.—Could you give me any information regarding the "Ormolu" finish on brass work of the best French periods? Is the color superimposed or is it due to the peculiar mixture of the metal. I do not, of course, refer to the modern "Ormolu" finish one sees mentioned in books and which is obtained by various lacquers and is only an imitation.

A.—Ormolu finish of the French periods resulted from the peculiar combination of the brass mixture and dipping acids used. To produce the soft velvety lustre the high or relief surface was then hand burnished.

Frequently the metal was gilded by the mercury process. The term then applied was "Ormolu Gold." Twenty-five or thirty years ago there was considerable of such art metal goods upon the markets of the world, especially clocks, candelabra, etc. The gilt color was frequently imitated by the aid of lacquers colored by organic pigments such as red sanders, gamboge, turmeric, annatto, etc. The American imitations of this splendid finish are nearly all produced upon an antimonial lead base, by the use of acid copper deposits and acid dips which are afterwards burnished, gilded and lacquered.

French ormolu mixtures contain a larger proportion of copper than common brass. The following is one of the usual compositions:

Copper	72.43
Zinc	22.75
Tin	1.87
Lead	2.95

C. H. P. Problem 2,082.

MANUFACTURING

Q.—How do you invoice tools, machines and fixtures in the yearly inventory of brass manufacturing plants? Give me full details and best methods to follow in order that it will work out satisfactorily.

A.—One of the best and most satisfactory methods is to have a ledger under furniture, fixtures and tools account. Charge all new tools bought in the course of the year and at the end of the year instead of taking inventory of same, charge to the account with 10 per cent. of the value taken off, which is a fair depreciation. As an example, if at the end of the year you have tools valued at $5,000, and 10 per cent. is allowed for depreciation for the year, the account is reduced $500, to which is added any new tools added during the year. If any renewals for worn-out broken parts are bought or made in the shop during the year which do not add value to the tools, such are charged to the operating or expense account.—P. W. B. Problem 2,083.

MIXING

Q.—I would appreciate it very much if you would give me a mixture for electric tram car brass trolley wheels and also for the hard brass bush. I understand that the metal for the wheels must be slightly softer than the copper cables and yet hard enough to give a service of ten thousand miles.

A.—The following mixtures are satisfactory for wheels and bushes:

	Wheel.	Bush.
Copper	90	87
Lead	1½	..
Tin	4	10
Zinc	4½	..
Phosphor copper	15%	3

J. L. J. Problem 2,084.

Q.—We are manufacturers of ornamental iron and bronze and make a lot of light castings such as grille work and elevator enclosures, etc. We would like to know if you can advise us to what extent or what per cent. of steel we could put with our mixture, without hurting the iron. We must have an iron that is soft and does not shrink beyond the usual rule, and all lines and ornaments on our castings must be clear and sharp.

We have been using some steel for quite a while, but we have a new foundry foreman who absolutely refuses to use it, claiming that it makes the iron dirty and sluggish, and that it shows on the castings. As we have quite a little accumulation of steel from our other departments we would like to use it up if possible.

A.—It is very difficult to obtain a uniform mixture of iron and steel when melted in the cupola. If a high silicon, high phosphorous pig iron is used, a small amount of steel, possibly 10 per cent., might be added and the resulting iron still used successfully for light ornamental work. If a larger amount of steel is used or if the pig iron is low in silicon and phosphorous, the iron will be sluggish, of high shrinkage and not well suited for small work.—J. L. J. Problem 2,085.

PLATING

Q.—It is our intention in the near future to erect a nickel plating room. Will you be good enough to advise us what is the best material for plating room floors?

A.—Probably the very best material for plating room floors is Akron acid proof brick. The bricks should be laid edgewise (not flat) and instead of using mortar or cement, boiling coal tar

asphaltum should be poured between the crevices of the brick. This gives an absolutely waterproof and acid floor that will last indefinitely.—C. H. P. Problem 2,086.

Q.—I have thirty-six glass tube bulbs for thermometers, and I wish to get a thirty-second of an inch copper plate on same. Will you kindly let me know how to accomplish same?

A.—To metallize glass tube bulbs proceed as follows: Mix platers' copper bronze powder with a gold size to a thin paint; then apply to the tubes with a fine brush or spray the mixture on to the tubes. Let the varnish, so applied, dry thoroughly, then immerse in a silver dip consisting of

Chloride of silver	½ ounce
Potassium cyanide	1½ to 2 ounces
Water	1 gallon

This should give a silvery appearance to the copper coating. Now wash carefully in water and plate in an acid copper bath. This bath should consist of the following:

Sulphate of copper	1¼ pounds
Sulphuric acid	2 to 4 ounces
Black molasses	⅛ ounce
Water	1 gallon

The voltage should be 1 volt and the temperature of solution not less than 70 degrees Fahr.—C. H. P.

Q.—What do you consider the best solution for plating steel? I only use it for a strike before nickeling or acid copper.

A.—A warm solution gives the best results. The proportions for such a copper bath is as follows:

Copper carbonate	4 ounces
Cyanide of potassium	8 ounces
Sodium bisulphite	1 ounce
Water	1 gallon

or

Cyanide of copper	3 ounces
Cyanide of potassium	4 ounces
Water	1 gallon

C. H. P. Problem 2,087.

Q.—Can you suggest any remedy for trouble caused by the presence of zinc in rapid nickel plating solution. After plating ten large zinc caps, which were well copper plated first (with the exception that the insides could not be satisfactorily got at), I found the deposit on other work darker in color, bright, very hard and brittle, which scaled off at the slightest touch, and has every appearance of an alkaline solution, but on testing found it only slightly so, I added pure sulphuric acid to slightly redden litmus paper, but the trouble remains. I keep solution slightly acid, and the free acid must have attacked zinc, hence the bother.

A.—We can suggest no permanent remedy to overcome the difficulty experienced by contamination of your nickel bath with zinc other than working out the zinc by the use of a strong current, using sheets of iron or cold rolled steel for the purpose. The action of the free acid as you surmise reduced the exposed zinc to a sulphate and by this decomposition of the free acid, the bath became alkaline. The addition of sulphate of magnesium may prove of value in overcoming the trouble. We suggest that you make an addition in the proportion of two ounces per gallon.

In plating zinc, it is necessary to use special solutions. One of the simplest formulas consists of the following proportions:

Water	1 gallon
Double Nickel Salts	8 ounces
Sulphate of magnesium	2 to 4 ounces

The following formula is used quite extensively in the United States for nickel plating sheet zinc direct, without previously copper or brass plating.

Nickel sulphate	10½ ounces
Ammonium chloride	10½ "
Potassium citrate	7 "
Water	2 gallons

The voltage should be from 2½ to 3 volts. The solution must be kept strictly neutral if the solution shows any acid re-action when freshly prepared. The acidity must be neutralized with pure caustic potash. The deposit is somewhat full but a pure white color results from the final polishing after plating.—C. H. P. C. H. P. Problem 2,088.

SOLDERING

Q.—We understand that it is possible to solder black iron by using chloride of zinc as a flux. We would kindly ask you in what form to use this chloride of zinc, dry or in acid; if so, what kind of acid. We also understand that the scale should be scraped off and then the surface treated with a solution of sulphate of copper. Is it not necessary to put some kind of acid in this sulphate of copper? If so, what kind of acid is best.

A.—The chloride of zinc which is used as flux in tinning and soldering operations is employed in two forms.

Where it is used merely to clean the surface of a metal in order to make the solder or tin stick, it is made by dissolving as much metal zinc as a given amount of hydrochloric acid will take up; that is to say, add scrap zinc in small pieces to, say, one quart of muriatic acid until the acid fails to dissolve any more. This solution which you have is chloride of zinc.

For a flux to be used on the top of a bath, as in galvanizing, chloride of zinc is used then in a solid form, which is obtained from the chemical houses or from the zinc people advertising in THE METAL INDUSTRY.

In using the sulphate of copper to treat the surface of the metal, no acid is necessary, the sulphate of copper is simply dissolved in water and applied directly to the metal to be coated.—K. Problem 2,089.

STRIPPING

Q.—We should be obliged if you would send us a recipe for stripping tin from copper.

A.—Probably one of the best and quickest methods to reduce tin from copper is muriatic acid. Use the commercial acid and try the acid undiluted first and note the results. Equal parts of acid and water used hot may answer the purpose better. Strong hot solutions of caustic soda and water also reduce the tin quite readily from copper without affecting the metal.—C. H. P. Problem 2,090.

TINNING

Q.—How can we prevent tinned articles from running when exposed to heat? We are using the hot process with two kettles and a mixture of half and half solder, shake them well, then dip, dry and still have a surplus of metal on them. Would like to run the metal hotter, but that sets the tallow on fire. Is there anything we could use in place of tallow?

A.—You can obtain a much thinner coating with pure tin than with half and half solder. It is suggested that you try out both on your work and see the relative cost per square inch of surface covered. If you wish to continue the use of solder you can obtain a thinner coating by poling the metal with green hickory poles and removing the dross. The addition of a small amount of phosphor tin may also be tried. You can get rid of the excess of solder also by placing the work, after thinning, in a "grease" pot for ten minutes or more. Have this pot full of whale oil, tallow or other high flashing flux and heat as hot as possible so the excess of solder will be drawn off the work.—J. L. J. Problem 2,091.

ZINCING

Q.—We have a customer who purchases spelter from us for zincing pipe fittings and who claims that the material in question when drawn from the zincing pot is not smooth, and the spelter adheres to the fittings in small drops.

A.—We should say if the metal in the zincing pot is not smooth that it must contain some dross, which may be due either to the impurity of the original spelter melted to make up the bath or too much oxidation after it had been melted and put into use. Drossy baths may be cleaned by using a liberal amount of chloride of zinc on the surface, together with a little tallow, and skimming off the dross that accumulates. If, however, the metal is too dirty, it might be better to have it refined and start over again. We could not say definitely what is the exact cause of this drossiness unless we saw a sample of the original metal in question.—K. Problem 2,092.

PATENTS

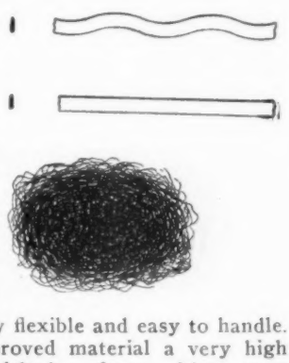
REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY

1,118,238. November 24, 1914. **Process of Manufacturing Fusel Oil.** Joseph Schreckenbach, Munich, Germany.

This invention relates to a process of manufacturing considerable quantities of fusel oil by allowing bacteria to act upon appropriate substances, such as starch, cellulose, and the like, or upon other materials containing any one of the just-mentioned substances. In contradistinction to the known methods of producing fusel oil, the basic material is in this improved method, subjected to the action of the so-called "heat-proof" bacteria, that is to say, such bacteria as are capable of standing for half an hour the heat of saturated steam having the temperature of boiling water, i. e., 100 deg. C.

1,118,255. November, 24, 1914. **Abradant.** Robert M. Akin, Ossining, N. Y.

This invention relates to abradants and particularly to that class thereof including metallic fibres gathered into a bunch or handful and particularly adapted for smoothing or polishing wood, varnish or other surfaces.

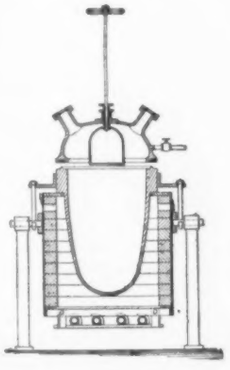


One of the inherent features of the improvements is the fact that the grain or fiber of the strip runs lengthwise thereof whereby tenacity, flexibility and resilience in high measure are obtained. In practice it has been found that for fine work a strip of steel having a width of slightly less than one hundredth of an inch and a thickness slightly less than a thousandth of an inch and provided with wavy edges as in the cut, when gathered into a bunch is highly resilient while exceedingly flexible and easy to handle. With such a bunch of the improved material a very high finish may be obtained on varnished surfaces with a comparatively small amount of labor.

1,118,820. November 24, 1914. **Furnace for Melting and Alloying Metals in Vacuo.** W. S. Simpson, London, England.

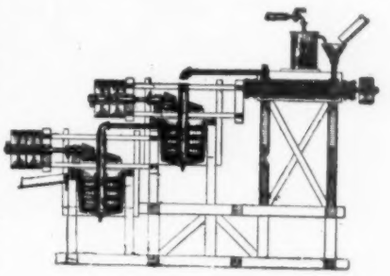
The object of this invention is to provide a suitable apparatus or furnace for melting, refining and alloying metals which have a lower melting point than iron, and particularly such metals as aluminum and its alloys which it is desirable to heat (and super-heat) in vacuo, to prevent oxidation and to facilitate the diffusion of the alloying metals.

In carrying out the purposes of the invention, a melting chamber of cast iron is constructed, lined with fire brick and provided at the bottom with a series of atmospheric gas burners for supplying the necessary heat, also containing a steel or cast iron melting pot or crucible provided with a cast iron cover so fitted and furnished with means of sealing that it may be held in position by atmospheric pressure while the vacuum chamber thus formed is in operation, the whole apparatus being mounted on trunnions, as shown in cut, to enable the molten contents of the crucible to be conveniently discharged. The cover of the crucible contains one or more eye pieces inset with glass to enable the operator to view the contents thereof, and is also provided with a receptacle composed of refractory material or of iron, operated by a sliding rod through the top of the cover, whereby various alloying metals or purifying metals may be added to the molten charge in the crucible, without breaking vacuum.



1,120,175. December 8, 1914. **Process for Recovering Precious Metals.** F. A. Wiswell, Oakland, Cal.

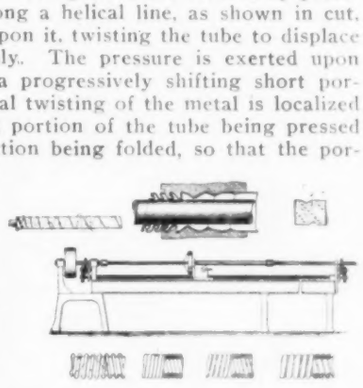
This invention relates to an improved process for extracting and recovering preferably precious metals, such as gold and platinum from sand, gravel or finely divided or pulverized material containing them by the use of mercury, in the form of a mercury salt, or metallic mercury, or both, with or without the aid of an externally obtained electric current.



An important object of this invention is to provide a machine, as shown in cut, of the above mentioned character, which may be advantageously employed to recover precious metals, particularly gold and platinum, from sand, gravel or finely divided or pulverized material, containing the precious metals in a finely divided state, whereby their recovery will be highly profitable, and the apparatus required to carry out the process will not be too expensive.

1,120,268. December 8, 1914. **Helically Corrugated Tube.** Louis H. Brinkman, of Glen Ridge, N. J., assignor to Baltimore Tube Company, of Baltimore, Md., a corporation of Maryland.

This invention relates to helically corrugated tubes, and the invention consists in the provision of helically corrugated tubes. The folds or corrugations are formed by pressing upon a plain tube along a helical line, as shown in cut, and while thus pressing upon it, twisting the tube to displace the pressed metal helically. The pressure is exerted upon the wall of the tube at a progressively shifting short portion thereof, and the actual twisting of the metal is localized to substantially the short portion of the tube being pressed upon or to the short portion being folded, so that the portion of the tube which has been folded to the desired final form is protected from distortion by the twisting force. The twisting of itself tends to fold the tube by distorting it helically and contracting it longitudinally, and thus greatly reduces the pressure required on the metal to deepen the folds, and if continued after the folds are thus formed, it reduces the pitch of the folds by continuously forcing the folds around helically analagous to the manner in which a helical spring of a certain pitch and diameter may be reduced in diameter and pitch by slipping it over a rod to prevent buckling, and holding one end down on the rod while twisting the rod and holding the opposite end of the spring from rotation, while permitting it to move along the rod.

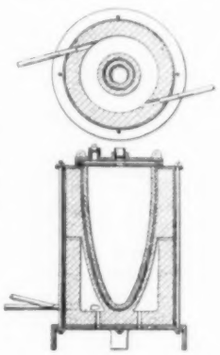


1,118,894. November 24, 1914. **Process of Producing Pure Zinc Oxid.** H. W. De Stucklé, Paris, France.

The present invention consists in lixiviating zinc from the minerals in the well-known manner by means of a suitable acid, such as sulphuric, hydrochloric, or nitric acid. The acid used is preferably mixed with a sufficient quantity of water in order to avoid crystallization of the zinc salt during lixiviation. The solutions obtained are deprived in the usual manner of foreign metals which are also partly dissolved by the acid. From the purified solutions zinc is precipitated in the form of zinc sulfite by a solution of ammonia sulfite. After the filtration and washing, the zinc sulfite is calcined. The residue of calcining is pure oxid of zinc which is suitable for all known purposes, that is to say, as a white pigment for painting and also as raw material for the manufacture of pure metallic zinc. The sulfur dioxid which escapes during the calcining is used for regenerating the ammonia sulfite.

1,120,732. December 15, 1914. **Crucible Furnace.** Grenville Mellen, Mount Vernon, N. Y.

This invention has for its object to provide a furnace, as shown in cut, adapted to general use, largely applicable to melting metals, particularly adapted to the melting of "scrap" metal, such as "clippings," "turnings," "filings," etc., which are to be converted into ingots for the trade, especial use being the melting of aluminum "scraps" which has heretofore been done at a loss of from ten to forty per cent. owing to the conversion into oxid, and which can be melted in the present furnace with the loss reduced to between one-half and five per cent.



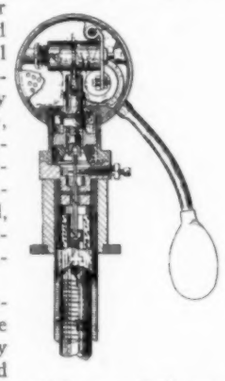
A further object of this invention is to provide a furnace in which metal can be melted or material treated by heat in the atmosphere of a partial vacuum which enables the withdrawal of gases arising from the material being treated, and, in the case of the melting of metals, which shall do much to obviate the injurious effects which arise from the occlusion of gas.

1,121,050. December 15, 1914. **Scleroscope.** A. F. Shore, New York, assignor to Shore Instrument and Manufacturing Company.

The invention relates to devices for testing the hardness of materials.

It relates furthermore to the class of instruments called "scleroscopes."

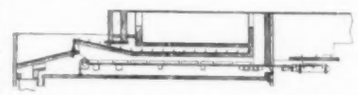
The cut shows a machine for determining the hardness of materials by measuring on a graduated scale the height of rebound of a miniature tap hammer, or striker falling from a predetermined height onto the surface of the material the hardness of which is to be measured. This small striker falling simply under its own weight (about 40 grains), always rebounds to variable heights depending upon the hardness or resistance to penetration offered by the material under test, which may be a metal, such as lead or carbon, or any substance capable of taking on a permanent set.



In the improved automatic instrument forming the subject matter of the present application, the necessary valves, the suction for the striker and release for the same are alternately operated by one bulb acting on a cam, through the medium of a piston, an adjustable oscillator and ratchets. This reduction from two to one suction bulb, rendering the adjustment automatic is a great advantage, since it leaves the hands more free, and secures more ease and convenience of manipulation.

1,121,621. December 22, 1914. **Furnace for Heating Metal Billets or Ingots.** Jerome R. George, of Worcester, Mass., assignor to Morgan Construction Company, of Worcester, Mass., a corporation of Massachusetts.

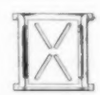
This invention relates to furnaces for heating metal billets or ingots preparatory to their being rolled and drawn into rods, wire, or other desired forms. One object of the invention is to provide a billet heating furnace so constructed that the cinder, slag and molten metal which drop from the highly heated billets may be conveniently removed from the furnace while the furnace is in operation. Another object of the invention is to construct a billet heating furnace, as shown in cut, so that the highly heated products of combustion will be brought into contact with the billets within the furnace in such a manner that the greatest heating efficiency of the fuel may be attained.



1,121,904. December 22, 1914. **Bearings.** H. H. Doehler, Brooklyn, N. Y., assignor to Doehler Die Casting Company, of the same place.

This invention relates to bearings, and more particularly to a type of bearing adapted for use in automobiles.

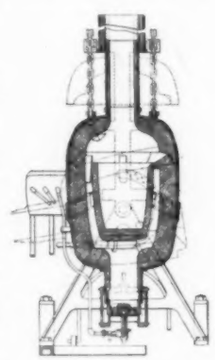
The main object of the invention is to provide a bearing containing Babbitt or similar bearing metal in a housing, which Babbitt metal and its housing will be so arranged and united as to form a unitary structure and prevent any displacement of the Babbitt metal, or the spreading or disruption thereof through the load thereon.



A further object is to provide a bearing, as shown in cut, adapted to be assembled in a machine without refinishing, which bearing will contain Babbitt metal so lodged in a supporting housing as to prevent the spreading of the Babbitt metal relative to said housing, while at the same time insuring the engagement of the Babbitt metal with the shaft at all times.

1,121,957. December 22, 1914. **Melting Furnace.** P. Vergnani, Somerville, Mass.

This invention relates to metal furnaces and pertains more particularly to a furnace, shown in cut, for the fusion of metals and having various features of improvement over those heretofore known in the art.



The inventor claims: In a furnace, a carriage, traction wheels therefor, a frame on said carriage including vertical pivotal means to permit relative rotation between said carriage and frame, a furnace body including a fusion chamber, trunnions on said furnace body to engage bearings in said frame, bearings in said frame to support said furnace body, detachable rotating mechanism secured to said frame and adapted to lock to one of said trunnions to rotate the furnace body in either direction, means to supply heat to said fusion chamber, means for supplying oxygen to said heating means in varying quantities, a fire dome for said furnace body, mechanism on said frame to move said fire dome relative to said furnace body, a counter-weight on said last mentioned mechanism, and guides on said fire dome to engage said frame.

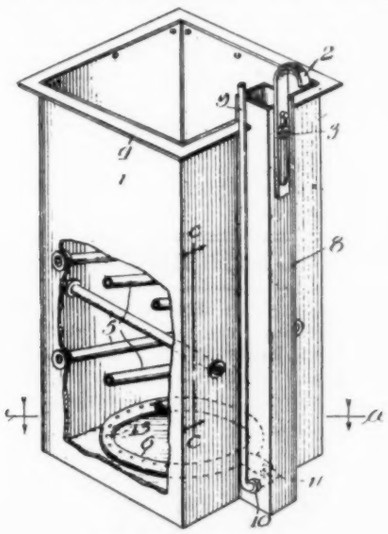
EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

PORTABLE SOLUTION HEATER

A recent innovation and one that should be appreciated by a great many platers is the Ele Kem portable solution heater, the invention of Louis Schulte, of the Ele Kem Company, Chicago, Ill. The heater will prove a very important adjunct to many plating departments where facilities for heating solutions are lacking, especially during the winter season. It is a decided step in the right direction and we can scarcely realize that such a simple yet important apparatus was not invented long ago. It is no doubt the first apparatus of its kind in the eelctro-plating field for the heating of solutions and will no doubt meet with an extensive sale.

As will be seen by referring to the cut the heater is made of sheet metal or cast iron heavily coated with tin, and can therefore be used in any kind of solution. It will not dissolve the asphaltum from the tank as the apparatus is so constructed that the cold air chamber faces the wall of the tank and the solution circulates through the tubes which are heated by a gas flame. The heater is connected with a metallic hose to any gas pipe and therefore can be transferred from one tank to another. It is



ELE KEM HEATER

a well known fact that plating solutions work better at a temperature of from 70 to 75 degrees Fahrenheit, and therefore by the use of this heater a solution in the winter time may be transferred into a summer temperature solution and get summer results.

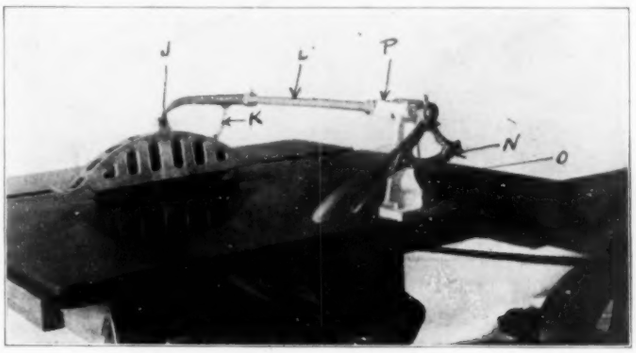
In a paper read by Professor O. P. Watts, of Madison University of Wisconsin, Madison, Wis., at the Chicago Branch of the American Electro-Platers' Society's banquet on December 12, he stated that warm solutions will plate quicker and brighter and eliminate the blistering and peeling off of the metallic coating, so the use of the Ele Kem heater may be said then to guarantee better results from solution in which it is used than may be obtained from solutions that are not heated. A test was made of this heater in a 300-gallon nickel solution in which the anodes were full of crystals of nickel sulphate of ammonia and after two hours the crystallization disappeared. After the heater had been in the solution one day it was possible to bend the articles plated in this warm solution without the nickel peeling off. This could not be done if the solution was in a cold condition.

Further information regarding these heaters and other mechanical devices that are adapted to the plating industry may be obtained from the Ele Kem Company.

ADJUSTABLE SAFETY SAW GUARD

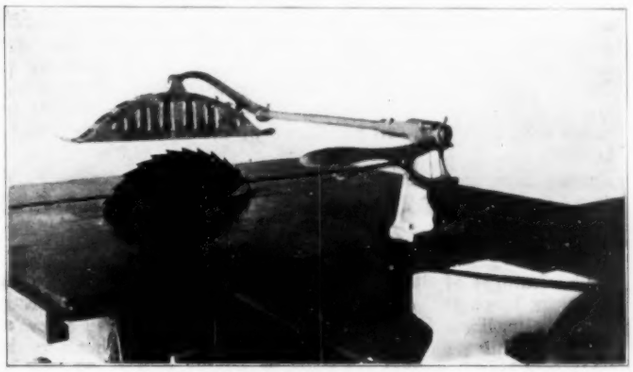
There are many improved safety mechanisms used on machinery for protecting operators, but one which is appreciated extensively by users of wood-working machinery is the adjustable safety saw guard shown in the illustrations and invented by *Hobart W. Curtis, of Waterbury, Conn.

Illustration "A" shows position of the guard during sawing



A SAFETY SAW GUARD IN USE.

operation. Illustration "B" shows the guard raised partially away from saw. Referring to illustration "A," the guard swings on pivot "J" and is prevented from hitting the saw by the chain "K." The horizontal shaft "L" carries on its end an arm for supporting the saw guard, and it is controlled by the handle "M," which is equipped with a segment ratchet "N" and pawl "O" for



GUARD RAISED PARTIALLY FROM SAW.

locating the guard at a suitable height. The horizontal shaft "L" is provided with a joint at "P" so that when the guard is not in use it is swung back. The guard is made from aluminum, and the working parts from steel and iron, this making a very efficient and rigid guard for the purpose. It is very easily and quickly adjusted to any position.

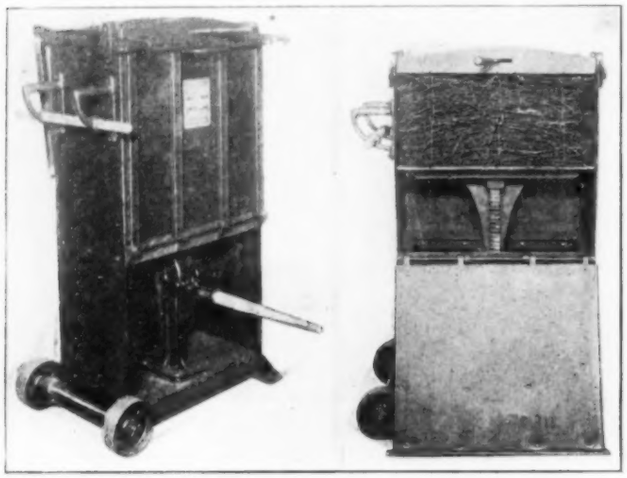
*Foreman, Pattern Department, The Waterbury Farrel Foundry & Machine Company, Waterbury, Conn.

THE TEMPUS BALING TRUCK

The economical disposal of waste metal of a tangled or frowsy nature has been a problem confronting the trade for a great many years. Scrap metal dealers are compelled to take quantities of this character of material in order to secure the heavier and more easily-handled stock, and after getting it to their yards either allow it to lie around and thus occupy valuable room, or dispose of it in an unprofitable manner. The Tempus Reclaim-

ing & Manufacturing Company, of 25 North Seventh street, Philadelphia, Pa., has perfected a line of baling presses specially adapted for handling such stock. Where the accumulation is large, that is, say 20 tons or more per day, a power-driven machine is available; where comparatively small quantities are to be handled, the baling truck illustrated herewith takes care of the conditions to perfection.

The truck is built of steel, is very simple in operation and very substantial in construction. The charging box is 24 inches long, 12 inches wide and 24 inches deep; outside dimensions of the machines are 32 inches wide, 22 inches deep and 52 inches high. In operation the cover is thrown back, material placed in the hop-



THE TEMPUS BALING MACHINE.

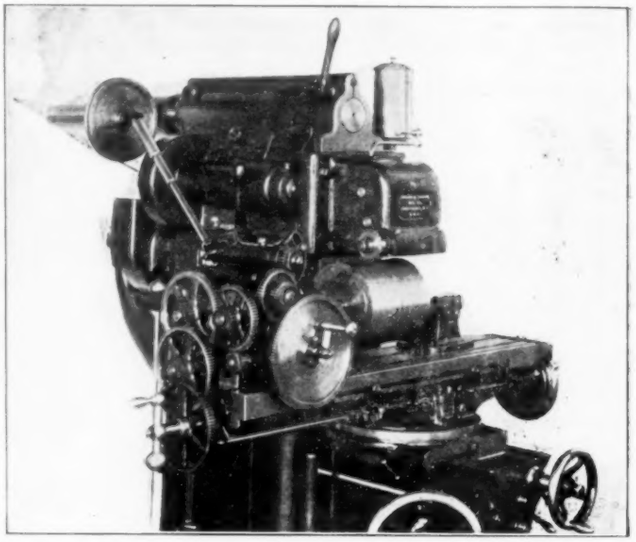
per and rammed down; when the hopper is filled the lid is closed down and securely locked by the lever shown at the front; pressure is then applied from underneath by a simple hoisting mechanism having a capacity of producing five tons pressure. This pressure will reduce the contents of the hopper about one-half. While the pressure is on the material the front door is opened, and tie wires laced through the slots as in an ordinary baling press. The contents of the finished bale are approximately 2 cubic feet, and weight, depending somewhat on the character of the stock, will vary from 100 to 150 pounds. The manufacturers are in a position to furnish the presses promptly, and will arrange with purchasers to handle all of the stock which is baled in them.

NO. 2 SHORT LEAD SPIRAL ATTACHMENT

For Use on Milling Machines.

The features of this attachment are a mechanism for rotating the work through the regular spiral head, taking power directly from the machine spindle instead of from the table feed screw as formerly, and a method of gearing from the spiral head to the table feed screw, so that the screw is rotated to give the lead by power from the spiral head instead of vice versa, as in previous practice. The attachment, as shown in cut, consists of a small diameter grooved pulley, mounted on an expansion bushing; a cast iron bracket fitting on the overhanging arm of the machine; and a bracket clamping over the dovetail on the top of the regular spiral head carrying a swivelling gear plate and a short shaft to which a large grooved pulley is connected by a telescopic shaft and universal joints. A large gear fitting on the regular spiral head in place of the usual index plate, and having 18 index holes, is also furnished, together with a change gear plate.

The grooved pulley on the expansion bushing is mounted in the rear end of the machine spindle. The cast iron bracket is clamped in position on the overhanging arm of the machine in the rear of the column and the bearing of the large grooved pulley mounted in the bracket. Power is transmitted from the pulley on the machine spindle to this large pulley by a round belt, either crossed or open, thence through the telescopic shaft and universal joints to the short shaft in the bracket on the spiral head. The regular index change gears furnished with the machine are used on the swivelling gear plate between this shaft and the large index gear to give the work the proper speed of rotation. A positive clutch operated by a lever on the bracket is provided for instantly stopping the rotation of the work. Eight-

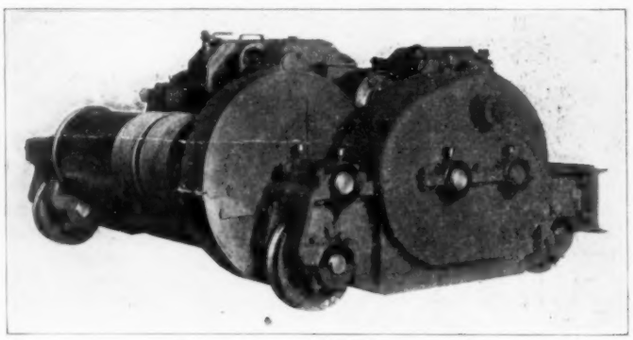


SHORT LEAD SPIRAL ATTACHMENT FOR MILLING MACHINES.

een holes in the large index gear allow indexing when cutting multiple threads. The attachment can be placed on either the Nos. 1, 1½ or 2 universal or plain milling machines, cone or constant speed drive. It is used on the regular 10-inch spiral head and is quickly attached, no fitting or drilling of holes being necessary. The attachment is manufactured by Brown & Sharpe Manufacturing Company, Providence, R. I., who will furnish further particulars.

TYPE "E" NORTHERN CRANE TROLLEY

The trolley shown in this photograph, in its general form, has been on the market for some time, but during the past year or so, several improved details have been added, and it now appears in a form thoroughly in accordance with the most recent crane engineering practice. Primary considerations have been safety,



TYPE E. NORTHERN ENGINEERING COMPANY CRANE TROLLEY.

both in the way of strength and in the protection of working parts; accessibility and rigidity, durability of gears and other moving parts have been secured by enclosing and protecting them from dust and grit, and running them in an oil bath. The construction is such that the covers of the gear cases must be in place or the gearing cannot run, thus insuring against the accidental omission of the gear covers, thus emphasizing the safety feature.

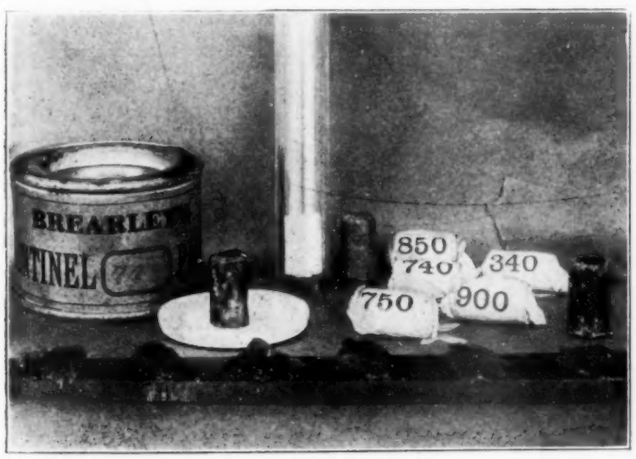
Each train of back gears is rigidly mounted in a single frame, bearings are bored in line and are all capped and fitted with through bolts—no studs—and are bronze lined. The hoisting

gear train from armature to drum gear is in one rigid casting, insuring permanent alignment. Drum gear is also enclosed with steel gear enclosure. The trolley travel gearing is entirely enclosed in a single rigid cast unit gear case of the same general type as that used for the hoist gearing. No overhung gears are used. As the gear covers are castings, the joints of the enclosed gear cases are planed so as to make a perfectly tight construction, thus preventing the leakage of oil and its dripping over the product of the plant. Lifting the cover of either gear cases removes the cap, and any gear with its shaft can be quickly lifted out, without disturbing other parts. In addition to the features mentioned above, the trolley is wired throughout with modern wiring in steel conduits, steel gearing is used, interchangeability and standardization, made possible by the use of standard jigs and templates, and other advantages. This trolley is made in capacities from 2 tons to 125 tons for either mill service or standard service. Mill service trolleys have axle bearings of either the vertically or horizontally capped McB type, according to type of service. It is manufactured by the Northern Engineering Works, Detroit, Mich.

METALLIC SALT PYROMETERS

A new method for measuring temperatures wherever heat is applied has just been developed by the Carl Nehls Alloy Company, of Detroit, Mich. This consists of different kinds of metallic salts which are made into molecular mixtures that will melt down at different temperatures, throughout the range between 220 and 1330 degs. C. Practical means have been devised for using these compounds, which have been named Sentinel, in place of the more costly pyrometers. They are also very useful for checking pyrometers. Then a cylinder is placed at the end of the thermo-couple, and when it melts the pyrometer should read the same as the temperature marked on the Sentinel.

One way is to cast them into solid cylinders, 7/16 inch in diameter and ¾ inch long, as shown by those standing on end in the cut. Each one is wrapped in a paper on which is printed its correct melting temperature in degrees Centigrade. These are shown by the samples lying down. For all temperatures below 932 degs. F. these "Sentinel Pyrometers" can be used in an air-tight glass tube, such as is shown in the center. The salts can then be



THE SENTINEL PYROMETERS.

used over and over again. By using the small porcelain saucer shown, the salts do not run to waste and litter up the place where they are used. This also enables them to be used several times, as the salt melts each time the temperature rises above the one marked on the cylinder, and becomes solid again the moment the temperature falls below this degree.

These salts are also made up in the form of a paste. Enough to make several hundred determinations is packed in the tins shown. Pastes with various melting temperatures can be daubed along a steel bar, as shown in the front of the picture and inserted into furnaces, ovens, retorts, flues, gas mains, steam pipes, etc., to find the temperature at which they are operating. The salts that melt down and those that remain solid will indicate the temperature which would be between the two. By using a long bar one can determine whether the temperature is uniform in the front and back, top and bottom, or corners of a furnace, oven, kiln, etc.

The many uses to which these molecular mixtures of metallic salts can be put are too numerous to mention. A few are: where metals are melted, cast, rolled, forged or heat-treated; in baking, enameling, japanning and other ovens; for flue, chimney, producer and other gases; distillation retorts; in gas engine exhausts; in chemical works, glass works, breweries, sugar refineries, etc.

BOLAND POLISHING AND BURNISHING MACHINE

The general adoption of the practice of burnishing metal articles and parts by means of steel balls in tumbling barrels has resulted in the introduction of various kinds of apparatus for doing the work, among them the Boland Polishing and Burnishing Machine. The latest development of this machine is shown in the accompanying cuts. These machines are made in several different sizes and styles, adaptable to different kinds and quantities of work. Number 4 machine has four individual, removable inner tubs, in which four different kinds of articles may be bur-

NO. 4 MACHINE WITH FOUR INNER TUBS.

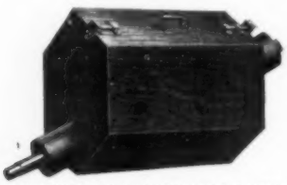
nished at one time. The floor space occupied is 4 feet 10 inches by 1 foot 9½ inches. Number 3 machine is fitted with removable tubs of different sizes, a very convenient arrangement where the work to be finished consists of articles of various sizes and shapes in small batches. In such cases the burnishing of three

NO. 3 MACHINE WITH THREE TUBS OF DIFFERENT SIZES.

distinct kinds of goods can be carried on in the one machine. Number 3 machine occupies a floor space of 3 feet 9 inches by 1 foot 9½ inches.

Another feature of the Boland machines is that diagonally-

mounted tubs, as shown in the small cut, can be substituted for the horizontal tubs whenever it is desirable to secure a combined diagonal and rotary motion at the same time. The method of operating the Boland machine is to place the work to be burnished in the tubs, together with a sufficient number of steel balls of the proper sizes, add water and fig, castile or other non-alkali soap, close the tank, fill the outer tank with water to

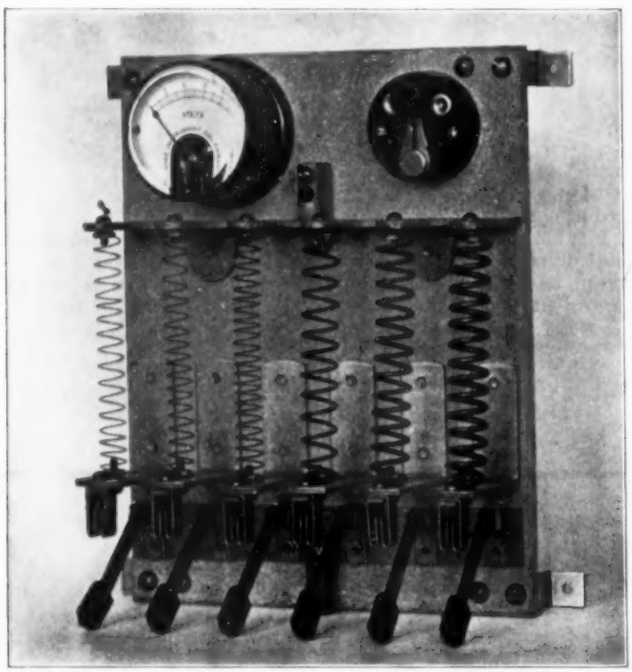


A DIAGONALLY MOUNTED TUB.

height of shaft bearings, then rotate the tubs until the desired finish is secured; the length of time depending on the nature of the work, speed, etc. Burnishing by this method is much the cheapest way, as one machine, requiring only part of one man's attention, will accomplish as much in a given period as several men do by hand methods. The Boland Polishing and Burnishing Machine is made by the H. J. Astle Company, 120 Orange street, Providence, R. I., who have recently issued several new "Boland Line" catalogs describing these machines and their line of blowers, sand blasts, hot blast dryers, pickle tanks, polishing benches, etc., including many machines of interest to the metal goods and jewelry manufacturer.

A NEW RHEOSTAT

A new rheostat has been put on the market recently by the Crown Rheostat & Supply Company, which comprises voltmeter, voltmeter-switch and rheostat. As shown by the cut, they are all mounted on one base, making it very convenient when ad-



THE NEW CROWN RHEOSTAT.

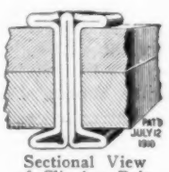
justing the current in the solutions to have a correct knowledge of the voltage across the tank. By throwing the voltmeter switch to the opposite point the dynamo voltage can be ascertained as well, thereby saving time and trouble in obtaining this information where one common voltmeter is used. The rheostat is the well-known type which are giving universal satisfaction because of their large range of regulation, and that can withstand any degree of overload without burning out. The voltmeter is a high-grade instrument, the best there is to be had. This outfit should prove a boom to every plater, for he no longer need work in the dark or walk around the plating room to see what the voltage across any certain tank is. For further information write the Crown Rheostat & Supply Company, 1434 Cullom avenue, Chicago, Ill.

CLINCHER BOLTS

The bolts shown in the cut are manufactured by the Self-Clinching Nail Company, Philadelphia, Pa. These bolts drive like nails and it is claimed they work from five to ten times as fast as ordinary bolts.

The bolts are placed and driven from but one side of the work and require no attention on the opposite side, for they clinch there automatically as a result of the blows given on the head. As shown in the illustration the only thing necessary to do to drive this bolt is to put it in the hole and drive on the stem with a hammer, driving it down as far as it will go.

Clincher Bolt



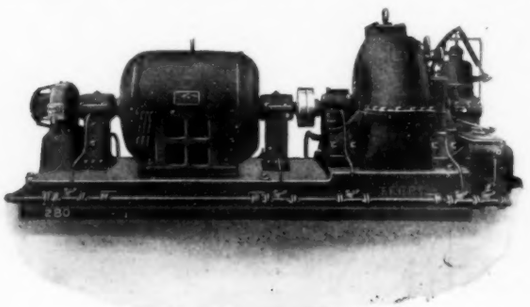
Sectional View of Clincher Bolt After Driving

Clincher bolts are made in lengths varying every one-sixteenth inch, the shortest being a quarter inch long. In the style illustrated the length is the distance from the head to the point. Some of the advantages claimed by the manufacturers for the use of these bolts are as follows: No nuts to take off or put on, nothing to loosen or fall off, no threads to damage or clog, no helpers required, no screw drivers, no wrenches, no clippers and no extra equipment.

TERRY TURBO-ALTERNATOR

The Excelsior Needle Company at Torrington, Conn., are adding a new building to their plant to provide increased manufacturing facilities necessary to fill the large orders resulting from decreased competition on account of the war. The power in their present buildings is largely supplied from line shafting driven by a Corliss engine, but the machines in their new building will be motor driven, in keeping with the modern spirit of efficiency.

To secure the necessary power for operating these motors they are adding a 375 KVA Terry turbo-alternator set to their present plant. This unit consists of a Terry non-condensing turbine direct connected to an Allis-Chalmers 480 volt, 3 phase, 60-cycle alternator with direct connected exciter. The alternator has a capacity of 300 KW at 80 per cent. power



TERRY TURBO ALTERNATOR.

factor. The turbine is supplied with steam at 100 pounds pressure and exhausts into the factory heating system under a vacuum of two or three inches, or into the atmosphere.

The turbine is the ideal drive for power units in new industrial plants or where changes are made to secure greater efficiency or capacity, and is now being more widely used for this purpose than ever before. The simplicity, efficiency and reliability of the Terry as manufactured by The Terry Steam Turbine Company, Hartford, Conn., recommends it strongly for this work. Where steam is required for any manufacturing operations the Terry is an ideal prime mover, as the exhaust is free from oil and can be used for heat.

ASSOCIATIONS AND SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE METAL INDUSTRY ORGANIZATIONS.

AMERICAN INSTITUTE OF METALS

President, G. H. Clamer, Philadelphia, Pa. Secretary and Treasurer, W. M. Corse. All correspondence should be addressed to the Secretary, W. M. Corse, 106 Morris avenue, Buffalo, N. Y. The objects of the Association are for the educational welfare of the metal industry. Annual convention with the American Foundrymen's Association in a succession of cities as invited. The next convention will be held in September at Atlantic City, N. J.

Secretary W. M. Corse reports:

"Our president, G. H. Clamer, reports that Jesse L. Jones, chairman of the Programme Committee, is actively at work and has already secured a number of valuable papers for the next meeting, and the prospects are that we will have at least as interesting a meeting as we had last year. The Publication Committee is at work on Volume No. 8 at the present time and expects to have it out in the spring.

"As soon as business conditions are somewhat improved, we expect to inaugurate a membership campaign similar to the one of last year, which ought to bring us good results. In common with the general conditions of the times, the Institute has not been able to do as much progressive work as we might hope, but as these conditions change, the activities of the Institute will change with them. The announcement that the next annual meeting will be held in Atlantic City is a very welcome one, and from all the arrangements so far made, there is no question but what it will be a very successful meeting. The present membership of the Institute is 305, all of whom are active."

AM. ELECTROCHEMICAL SOCIETY

The American Electrochemical Society held its usual two meetings in 1914. The twenty-fifth general meeting of the society was held in New York City on April 16, 17 and 18, with a registration of 324 in attendance.

The twenty-sixth general meeting of the society was held at Niagara Falls, October 1, 2 and 3. The subject of the symposium at this meeting was the "Practical Side of Electrochemical Investigations," and took the form of a series of experimental demonstrations, occupying an entire day at the Fitzgerald Laboratories. The other papers of the meeting were well distributed over the various important topics of electrochemistry.

AMERICAN FOUNDRYMEN'S ASSOCIATION

President, R. A. Bull, Granite City, Ill.; Secretary and Treasurer, A. O. Backert. All correspondence should be addressed to the secretary, A. O. Backert, Cleveland, Ohio. The objects of the Association are for the educational welfare of the iron and metal industry. Annual convention the latter part of May or early in June each year, in a succession of cities, as invited. The Convention of 1915 will be held in September at Atlantic City, N. J.

NEW VICE-PRESIDENTS OF THE AMERICAN INSTITUTE OF METALS

R. B. WALLACE,
National Cash Register Company, Dayton, Ohio.

W. H. BASSETT,
American Brass Company, Waterbury, Conn.

E. B. HORNE,
Packard Motor Car Company, Detroit, Mich.

(Photographs of the other two new officers, G. C. Store and H. W. Gillett, are not available.)

Secretary A. O. Backert reports:

"Probably none of the technical organizations of the world has a brighter future or a greater opportunity for growth than the American Foundrymen's Association, When it is considered that there are more than 6,000 foundries in the United States and Canada, of which at least two members of each organization are eligible to membership, it is evident that the present enrollment of slightly more than 800 marks merely the beginning of what its membership should be. In other words, this society is merely in its infancy, and its opportunity for growth is tremendous.

"During the past year, in spite of unfavorable trade conditions, practically 150 new names have been added to the membership, and in the past two years the increase in enrollment has been nothing less than phenomenal. At the meeting at Chicago in September, 1914, the papers presented and addresses delivered, in number exceeded those of any previous gathering, and the Cost Congress, which featured one of the sessions, attracted an unusually large attendance. The interest manifested at this session indicates that the cost problem is one of the most serious questions which foundrymen have to face today. At our next meeting, to be held at Atlantic City in September, 1915, one en-

YOUNG'S MILLION DOLLAR PIER AT ATLANTIC CITY, N. J., WHERE THE 1915 FOUNDRYMEN'S CONVENTION WILL BE HELD THE WEEK OF SEPTEMBER 17.

tire session again will be devoted to a discussion of foundry costs, and it is hoped that something will develop that will enable the foundrymen to finally adopt a uniform system upon which they can base their estimates for new work.

"In the revision of its constitution and by-laws, the American Foundrymen's Association made a forward step in assessing an entrancce fee of $10 and, in addition, associate memberships were provided for at one-half of the active membership dues.

"The past year has been exceedingly satisfactory from every viewpoint, and the future holds in store for the American Foundrymen's Association brighter prospects than at any time in its history."

A movement is also on foot which will lead to the affiliation of the Associated Foundry Foremen with the American Foundrymen's Association and this probably will be consummated by the first of the year.

AMERICAN SOCIETY FOR TESTING MATERIALS

President, A. W. Gibbs, Philadelphia, Pa.; Secretary-Treasurer, Edgar Marburg, University of Pennsylvania, Philadelphia, Pa., to whom all correspondence should be addressed. The Society is affiliated with the International Association for Testing Materials and is a corporation formed for the promotion of Knowledge of the Materials of Engineering and the Standardization of Specifications and the Methods of Testing. Meets annually, the time and place being fixed by the Executive Committee.

Secretary Edgar Warburg says:

"During the past year a number of new high-water marks in the activities of the society have been set. The proceedings have grown to such proportions that it has been found necessary to publish the committee reports and the technical papers in two separate volumes, averaging about 600 pages each. The activities of the thirty-five technical committees may best be judged by the statement that in a single year there have been forty committee meetings and seventy-nine sub-committee meetings, with a total attendance of about 1,100. The growth of the society in point of numbers has been consistently maintained, and ninety-seven new members have been admitted since the annual meeting six months ago, the total membership now numbering 1,748.

"It is gratifying to state that there is every indication that the work of the society will be prosecuted with unabated vigor during the current year. The Seventh Triennial Congress of the International Association for Testing Materials, with which the American Society is affiliated, was to have been held next September in Petrograd. One of the many effects of the European war is the indefinite postponement of this congress for which elaborate preparations had already been initiated."

AMERICAN ELECTRO-PLATERS' SOCIETY

Walter Fraine, supreme secretary, says:

"The year 1914 for the American Electro-Platers' Society has been one of progress and accomplishment. At the beginning of the year there were fourteen chartered branch societies. Two more have been added during the year: Bridgeport received its permanent charter in July, and Cleveland, at present working under a temporary charter, was organized in November. Every branch society has added to its membership during the year, and while the increase has not been so great as to excite remark, it has been gratifying.

"The great event of the year was the first annual convention, held in Chicago the first week in June. Its sessions, presided over by our past president, George B. Hogaboom, were noteworthy for the constant attendance of the delegates and their attention to the matters under discussion. A large number of visitors attended both the business sessions and the round tables held each evening. Legislation that will have a great influence on the society's future was enacted. One important result was the changing of the official publication from a quarterly to a

monthly, under the name of The Monthly Review, and the election of Mr. H. E. Willmore to guide its destiny. The result shows that the delegates picked the right man.

"The greatest accomplishment of the year, however, is the broadening of the spirit of fraternity within the society itself. The reserve which has been a characteristic of the old-time electro-plater, is fast disappearing under the influence of the society. The members, realizing that to receive they must also give, are placing the results of their experience before their fellows, to the advantage of the profession. And yet, with every promise the society has made for 1914 fulfilled, it has only been a year of preparation for the year to come. The year 1915 promises a great increase in prestige and usefulness for the society. It is expected that branches will be organized early in the year in Toledo, Ohio, and in Grand Rapids, Mich. These are in sight; others will follow; the impetus acquired in the year just ended will have its effect on our progress and advancement in 1915."

New York Branch held its regular monthly meeting at the Broadway Central Hotel on Friday evening, December 18. After the regular business a paper on the spotting-out problem was read by Mr. Thomas Brown. It is stated that preparations are well under way for the annual banquet to be held on Saturday evening, February 20, 1915, at the above hotel.

Newark Branch.—A special meeting was held January 8, at which C. H. Proctor, the founder of the society, and F. A. Rojas made very interesting speeches. A further account of this meeting will be given in the February issue.

Bridgeport Branch.—The regular monthly meeting of this branch was held December 18 with an attendance of about eighty platers, superintendents and chemists of the leading metal working plants throughout New England. The principal event that took place at this meeting was a demonstration of metal cyanides by Messrs. Dittmar, Schneider and Proctor.

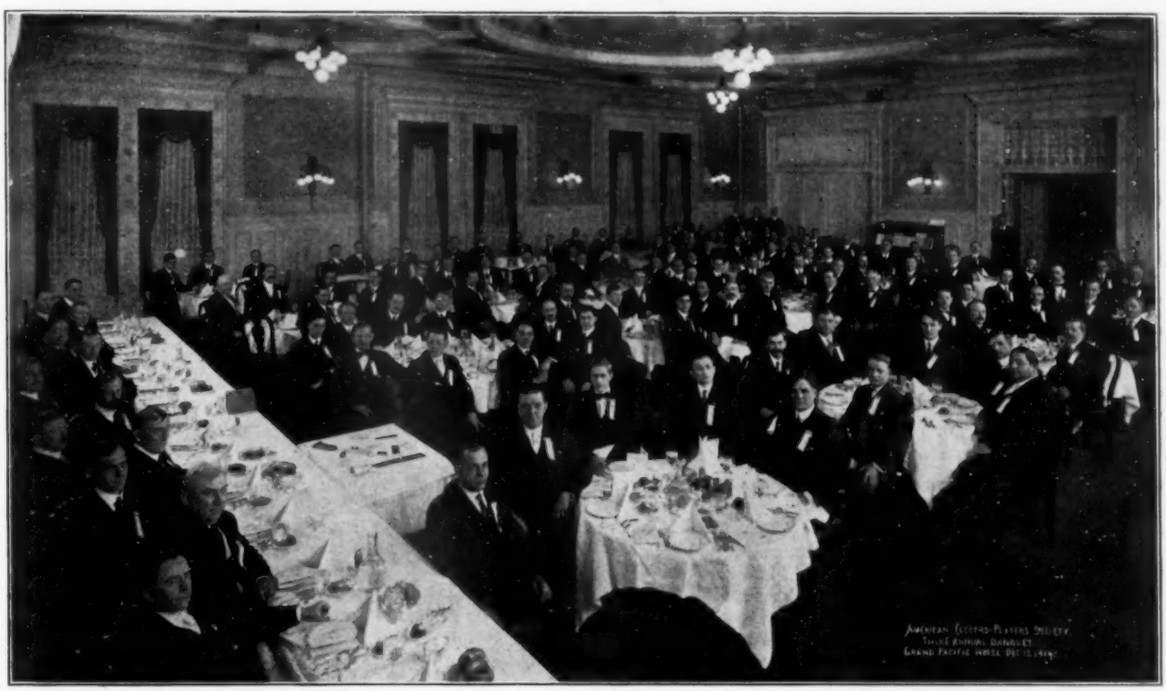
Mr. Dittmar read a paper which had been written by M. J. Weber, who was unable to be present. This paper told of the tendencies of the plater to demand chemically pure materials and gave figures which showed the decided economy of the metal cyanides as compared with copper carbonate, and acetate and cupri-cupro sulphite of copper, commonly known as red copper compound. Mr. Schneider followed the reading of the paper with a practical demonstration of a copper solution made up with copper cyanide, while Mr. Proctor gave a talk on the practical side of electro-plating and gave some interesting figures on the results obtained in a mechanical barrel solution by using metal cyanides by one of the largest manufacturers and platers in Connecticut.

CHICAGO BANQUET

On Saturday evening, December 12, the members of Chicago branch, A. E. S., with a large number of manufacturers and superintendents of manufacturing establishments as guests, sat down to partake of a splendid menu, enjoy the excellent music and profit by the brilliant papers on subjects of interest to the plating industry, it being the occasion of the third annual banquet of this hustling branch of the American Electro-Platers' Society.

Oscar E. Servis, president of the branch, was toastmaster, and acted like a veteran in that office. He made an address in which he told of what the society is doing and spoke of its aims and objects. Joseph H. Hansjosten, of Kokomo, Ind., supreme president of the society, member of Chicago branch, addressed the members and guests and spoke of the progress the supreme society and the various branches had made.

Dr. Oliver P. Watts, of the University of Wisconsin, who is an honorary member of Chicago branch and of the supreme society, read a masterly paper entitled "Some Observations on Nickel Plating Solutions." S. E. Huenerfauth read a paper on "The Voltmeter and Ammeter." Walter Donnelly's paper dealt with the "Pitting of Nickel Deposits." Louis Schulte's paper was on "Hints of Value to the Plater." H. E. Willmore spoke on "Finger Tips." Letters were read from Walter Fraine, supreme secretary; Harry De Joannis, Earl Eckenrode, and Past Supreme President George B. Hogaboom—all of them being of such a nature that they were thoroughly enjoyed by all present.



BANQUET OF CHICAGO ELECTRO-PLATERS AT GRAND PACIFIC HOTEL, CHICAGO, ILL., DECEMBER 12, 1914.

A practical demonstration of the economical advantages of the metal cyanides will be given at the Lewis Institute, Chicago, Ill., Thursday, February 11, 1915. This demonstration has been arranged to afford those interested in the use of metallic salts an opportunity to judge of the superior results to be obtained from these metallic cyanides in comparison with such salts made at home. Invitations to attend have been extended to members of the American Chemical, American Electro-Chemical and the American Electro-Platers' Societies and also to members of other societies who may be interested.

PERSONALS

ITEMS OF INTEREST TO THE INDIVIDUAL.

A HALF DOZEN OF THE METAL INDUSTRY AUTHORS, SERIES 1

JESSE L. JONES

Jesse L. Jones, whose name or initials are very familiar to the readers of THE METAL INDUSTRY as one of the oldest contributors if not the oldest in point of time, is the chief metallurgist of the Westinghouse Electric and Manufacturing Company, Pittsburgh, Pa., where he has been since 1903. Mr. Jones' career previous to his present connection was published in the January issue of THE METAL INDUSTRY for 1909, and it is therefore not necessary to repeat it here.

JESSE L. JONES.

Mr. Jones since his connection with the Westinghouse people, has become still more widely known for his enthusiastic support of the work of the American Institute of Metals and the American Society of Testing Materials, being chairman of several committees and a member of others which are engaged in perfecting the work of standardization of methods and materials. Mr. Jones is the chairman at this time of the Papers Committee of the American Institute of Metals, and this fact alone insures a wide and varied program of papers that will be presented at the annual convention to be held in Atlantic City, N. J., next September.

CHARLES H. PROCTOR

A description of Mr. Proctor's career was published together with that of J. L. Jones' in the January issue of THE METAL INDUSTRY for 1909 and consequently the present sketch will begin where that left off.

CHARLES H. PROCTOR.

The last line of our 1909 notice regarding Mr. Proctor stated that he was interested in forming a society for platers. At the present time Mr. Proctor's efforts and consequent success regarding this society are well known history. He was remarkably successful in launching the society now known as the American Electro-Platers' Society, having a membership of over six hundred with branches in fourteen cities. Besides the arduous and tedious work connected with the establishing of the electro-platers' society, Mr. Proctor, as the readers of THE METAL INDUSTRY know, has found time to write a number of articles, answer a few hundred shop problems and attend to his many business connections as well.

Bringing the history up to the present time we find Mr. Proctor a member of the selling force of the Roessler & Hasslacher Chemical Company, of New York, N. Y., being actively engaged in acquainting the plating industry with the advantages of using the cyanides of the metals as scientifically prepared, compared with those made in the shop from often impure materials.

WILLIAM H. PARRY

William H. Parry, the author of articles relating to pattern making and foundry practice which entertain so many of our readers, was born in North Wales, Great Britain, and arrived at Castle Garden, N. Y., in 1869. His early education was obtained in three public schools at that city, and in Brooklyn, N. Y., where he learned how to talk English.

WILLIAM H. PARRY.

Mr. Parry's business career began at the age of twelve, when he was apprenticed as a pattern maker in an iron foundry, completing his apprenticeship in seven years. He spent the next twenty years of his life as a journeyman pattern maker, doing all classes of pattern work, such as machine, marine, architectural and stove. In January, 1908, he was appointed superintendent of the National Meter Company, of Brooklyn, N. Y., where he still holds forth and where he gets the material for his bright, witty and common sense articles that he is induced to furnish THE METAL INDUSTRY with from time to time. We are pleased to announce that one of Mr. Parry's characteristic articles is begun in this issue of THE METAL INDUSTRY.

ROYAL F. CLARK

Royal F. Clark, a prominent plater, well known not only for his plating ability, but also for his enthusiasm and loyalty to the American Electro-Platers' Society, was born at Trenton, N. J., where he received his early education in the public schools. After making a business start in the capacity of an electrician he finally devoted himself to electro-plating and has made it his life work.

ROYAL F. CLARK.

Mr. Clark has disproved the truth of the well-known adage that a "rolling stone gathers no moss," because while he has been considerable of a rolling stone he certainly has gathered moss in the guise of a store of knowledge. We find that Mr. Clark at various times in his life has been following his bent from Sumter, S. C., through Columbus, Ohio, to Winsted, Conn., until he finally brought up in New York City, making his longest stop of six years. On December 14 last, Mr. Clark again took up his travels and is now stationed at Wellsburg, W. Va., as foreman of the electro-plating and buffing department of the Eagle Brass and Manufacturing Company.

We hope to have Mr. Clark entertain our readers with some more of his instructive articles as soon as he gets settled in his new home.

FRANK A. JOHNSON

Frank A. Johnson, or, as he is better known to the readers of THE METAL INDUSTRY as "Easy Way" through his articles on the press and die working and spinning of metals, was born in Montana between the Little Big Horn and Rosebud rivers with a tepee for a house and a buffalo pelt for a blanket. His parents were massacred by the Indians when he was eighteen months old and he was rescued by a white man and delivered to his grandparents, who lived in Michigan.

FRANK A. JOHNSON.

After a public school education, Mr. Johnson became very much interested in the progress of the telegraph and phonograph and at one period of his career he lectured at Brown Univeristy, Providence, R. I., on "How the Telegraph and Phonograph Talk." Mr. Johnson has served a number of firms as a mechanical expert and at the present time he is devoting his energies to the development of scientific management for the benefit of concerns which are found to be suffering from dry rot. We expect shortly to begin another very interesting series of articles by Easy Way which will be devoted to the artistic finishing of metals.

ARTHUR F. SAUNDERS

A. F. Saunders, who writes the interesting articles relating to the origin of style in metal work, was born in Brooklyn, N. Y., of English parentage and had a common school education. Mr. Saunders was always interested in the design and manufacture of artistic metal work, as is attested by the fact that he was only sixteen when he was an apprentice to the George W. Shiebler Company, silversmiths, of New York and Brooklyn, N. Y. During Mr. Saunders' six years of apprenticeship he attended a three years' course in designing at the Pratt Institute and also two terms of drawing at the Adelphi Academy. After changing his business connection several times we find Mr. Saunders holding the position of chief designer for the Benedict Manufacturing Company, of East Syracuse, N. Y. He has another article in this issue.

ARTHUR F. SAUNDERS.

DEATHS

CHARLES MARTIN HALL

Charles Martin Hall, vice-president of the Aluminum Company of America, Pittsburgh, Pa., died at Daytona, Florida, on December 27, where he had gone in an effort to recover his health.

CHARLES M. HALL.

Mr. Hall was born in 1864 at Thompson, Ohio, and educated at Oberlin College. After leaving college he turned his attention to the manufacture of aluminum and succeeded in discovering the process which afterwards bore his name and which completely revolutionized the manufacture of aluminum and brought its price down from that of a chemical curiosity to one of commercial possibility. At the same time Dr. Paul L. T. Heroult, the great French chemist, made the same discovery as Mr. Hall, and a dispute arose which lasted several years, but finally in 1899 Mr. Hall obtained a patent from the United States government which continued in force throughout its legal life.

The first company that Mr. Hall was interested in the founding of was the Pittsburgh Reduction Company, which finally produced aluminum at fifty cents per pound. This company was afterwards merged into the Aluminum Company of America, which is the present title and which has enormous plants at Niagara Falls, N. Y.; Massena, N. Y., and Tennessee.

While he had not enjoyed good health for the last five or six years, Mr. Hall worked with untiring energy up to the time of his reath, which was not unexpected. Mr. Hall was a member of the University Club of New York, the University Club of Buffalo, the American Association for the Advancement of Science, the Institute of Electrical Engineers of Great Britain, the American Philosophical Society, the Franklin Institute of Philadelphia and the American Electrochemical Society. He was unmarried and resided at Niagara Falls, N. Y.

Barton Sewell, president of the Braden Copper Company and vice-president of the American Smelting and Refining Company, New York, died at his home, January 7, 1915, after an illness of seven months. Mr. Sewell is survived by two sons.

Edward L. Wallace, for many years general manager of the Cohocksink Brass Foundry, Philadelphia, Pa., died at his residence, 1934 North Fifth street, following a brief illness. He was fifty years of age. Mr. Wallace was a member of the Mt. Olive Lodge, No. 375, I. O. O. F., and a director of the Comet Building and Loan Association.

William Henry White, president of White & Brothers, Inc., Richmond and Hedley streets, Philadelphia, Pa., smelters and refiners, died at his home after a four weeks' illness of pneumonia. He had been in the smelting business for nearly forty-five years. Mr. White, who was seventy-five years old, is survived by a widow, two sons and a daughter.

Nicholas Jenkins, a retired inventor, died at his home, Waterbury, Conn., November 30, at 81 years of age. Mr. Jenkins was one of the best-known mechanical inventors in the Naugatuck Valley. Although he retired from actual service of the Holmes, Booth & Haydens Company, now a branch of the American Brass Company, about thirteen years ago, he was still active perfecting inventions he had worked out in recent years and developing earlier inventions. From 1879 to 1901, when Mr. Jenkins was connected with the Holmes, Booth & Haydens Company, he was kept busy designing not only for the factory, but also in designing original inventions of his own. He was instrumental in perfecting many of the modern features of all kinds of lamps and lamp burners and had not a little part in the great boom in production of these articles that the company enjoyed. Mr. Jenkins is survived by his widow and two grandchildren.

TRADE NEWS

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS AND TRADE ITEMS OF INTEREST FROM THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

WATERBURY, CONN.

JANUARY 11, 1915.

Throughout the Naugatuck Valley uncertainty marks the attitude of practically all branches of the metal industries towards the new year. With the close of 1914 the lowest ebb tide in years had been marked in many brass and copper producing lines and there were so few certain symptoms of improvement in any line of business that even the most optimistic hesitated to offer outspoken opinions that the new year would show a better result. It is too early yet to decide whether or not such caution was warranted, as several factories that ordinarily resume operations promptly after New Year's day are still shut down and there is no tangible basis on which to estimate prospects for new orders. It is an extremely uncertain period in which the business of metal goods production finds itself.

There seems to be no lack of hope. Waterbury manufacturers, when pressed to give their opinions on the outlook, speak hopefully, but make it plain that it is personal hopefulness. This is in itself a valuable element for good. It means that there is no doubt of the soundness of business generally and that things will come right if the buying power resumes activity. War will have more or less to do with the resumption of consumption on a scale large enough to make shops go on full time, but there is also a very noticeable impression that if internal conditions in this country improve a little there will be a noticeable improvement in local industry. This is interesting, in view of the fact that during the past quarter of 1914 practically all the activity hereabouts was due to rush orders for machinery or stock required by concerns filling war orders. The only factories busy aside from those rushing out war orders were those producing material for automobile manufacturers, notably the Benedict & Burnham plant of the American Brass Company.

Practically all the "war orders" were for machinery or stock to be used in weapons of destruction, such as cartridge machinery, lead bullet-making machinery, stock for use in the manufacture of shrapnel shells and other ordnance. With the approach of Christmas there seemed to be a falling off even of these orders, so that it was natural to find a deep shade of blue in the local holiday atmosphere.

Business during the first half of 1914 was fairly good, though far from satisfactory. The summer months were quiet and uncertain and the shiftless and careless shophand began to learn that no faults could be overlooked easily, and that disregard of discipline meant a month's vacation with doubtful prospects of reinstatement. Payrolls were continually shrinking and the coming of the war knocked hopes to smithereens. September brought a suggestion of a revival, but only that, and it was the war's business only that made it possible to recall idle hands and to start anew shops which were really about to close down indefinitely for lack of orders.

First to benefit from the revival produced by war orders were the big machine shops, the Waterbury Farrel Foundry & Machine Company and the E. J. Manville Machine Company. The Scovill Manufacturing Company soon began to add to its active operatives and its plants assumed an atmosphere of good times during November. There was some semblance of greater activity at the Chase Rolling Mill Company's mills and also at the big new Chase tube mills, but the dismal picture of hundreds of men grouped about factory gateways hoping to be hired for even a day continued right up to the holiday shut-down.

Outside Waterbury the conditions seem to have been quite the same as here. Small concerns have managed to keep going on slow speed and have benefited considerably in recent months by rush orders for material for Waterbury concerns. Some Ansonia plants benefited by a short period of overtime just before the holidays because of orders from the Scovill company for tube metal, presumably for shrapnel shells. Thomaston still lagged, the Plume and Atwood Manufacturing Company's mill showing greater activity than the Seth Thomas Clock Company's plant most of the year. Torrington did fairly well. There the Coe Brass Company, branch of the American Brass Company, was fairly busy the year around, though seldom operating with a full complement of help. There was only a fair year's business done by the other Torrington concerns. Seymour has had a fair year, but one that workmen might call a poor year, for while the work has been fairly steady the shops have not been running full time or with full payrolls. Retrenchment and extreme caution in handling business has marked the management of all plants, undoubtedly because safety demanded such a policy.

Thomaston learned January 8 that the president of the Seth Thomas Company, W. T. Woodruff, who has been connected with the company for nearly fifty years had resigned. Vice-president Thomas D. Bradstreet is acting president until February 9, when the annual meeting will be held. Mr. Woodruff is retiring on account of age, it is understood. Mr. Bradstreet emphatically denies rumors that he intends to resign.

There is some interest locally in the recent statements of Engineer Flinn, of New York, concerning the poor records of brass and bronze parts in water works and the experience of New York City engineers with them in the Cattskill aqueduct construction. Local brass producers will not be interviewed on the subject now, but the matter will certainly be thoroughly aired before the subject is dropped.—F. B. F.

NEW BRITAIN, CONN.

JANUARY 11, 1915.

Persistent rumors to the effect that several New Britain factories have, in the past few days, received large orders for their wares, while in some cases unfounded, are an indication of what may be expected for the near future in the hardware line; New Britain's specialty. While the local manufacturers have been mighty busy during the several months of the war already past in seeing that they do not enter any financial pitfalls, and taking great pains to keep on the safe side of the monetary fence which, of course, meant a slackness in business and a consequent inability to meet the sudden demands for their products, as they had allowed their stock to become depleted. There is very little doubt but that the expected rush of orders in a short time will warrant the factories running on full time, or possibly in some instances double time. According to a recognized authority on these conditions there exists at present in practically every portion of the globe a demand for hardware and steel goods. This demand is increasing and the local factories will necessarialy be called upon to supply their share of the products. If the circumstances, as created by their firms themselves are such that they may safely assume the obligations incident to the fulfilment of big contracts, this city may well look for big business during the first part of 1915. The feeling is that the tide has turned for the better.

A. F. Corbin, president of the Union Manufacturing Company, says that "although business conditions are very bad in many lines and most people are very blue, we feel that the tide has now turned for the better." This fact is borne out by the fact that only two days' vacation was given most of the city's shop workers for Christmas. This in itself indicates that business is much better than it might be.

Without doubt two of the busiest factories in New Britain at this time are the Landers, Frary & Clark Company and the North & Judd Manufacturing Company. In the latter shop it was possible to close down only one day for Christmas. In the first named concern all sorts of cutlery, bread and cake mixers, coffee percolators, etc., that are used as holiday gifts are made and this is their harvest season.

That business is picking up at North & Judd's, due to war orders, is admitted in an interview with H. C. Noble, vice-president and treasurer of the company. But that the firm has received orders to manufacture $30,000 worth of goods for the allies is denied by Mr. Noble. "We have some orders that are

presumably for foreign countries," Mr. Noble said, "but, of course, we don't know that they are for foreign countries as all we do is to deliver them in New York. But I am inclined to believe that they are ultimately destined for Europe as I have looked them over and find that they are for goods peculiar to foreign military uses." Mr. Noble also said that his firm is manufacturing its usual goods for the United States government, but there is nothing strange in that as it is only the annual order. Be the causes what they may the working classes, as well as these particular captains of industry, have been rejoicing in that they have been compelled to run their plant night and day.

The New Britain Machine Company, which has been very dull, is receiving some orders and Treasurer Herbert H. Pease has just returned from a business trip abroad. He states that England is preparing for a long war and that "business is fairly good over there." Treasurer Pease left for England on November 4 and it is said that he sent the New Britain Machine Company some large orders while on the other side of the ocean.

At the Waterbury Tool Company business is fairly good, making the hydraulic speed gears for battleships. This hustling concern is also getting out a new equipment which will apply the hydraulic gear principle to the rudder for steering the big battleships.

Another item of interest in the metal manufacturing world is that the American Hardware Corporation of this city, which has sold to the Cushman Chuck Company of Hartford, the plant formerly owned by the Universal Screw Machine Company in Hartford. The sale is said to have been made for between $45,000 and $50,000. The original cost of construction was $80,000. Two years ago the American Hardware Corporation bought out the Hartford concern and the plant in that city was dismantled. Last summer the business was removed to this city and is now in operation in the new building erected here for that purpose.—H. R. J.

BOSTON, MASS.

JANUARY 11, 1915.

Establishments in the metal industry of this city and suburbs have passed through a year in which activity has been below normal for nearly all branches, even the repair shops, which sometimes profit by a lull in the manufacturing of new goods, are finding demand for their work unusually quiet.

Some of the biggest concerns in the city in manufacturing lines wherein the products are mainly of copper and brass report matters very dull over the end-of-the-year period, and frankly admit that in the outlook there is no clear indication of improvement, although hopefulness is by no means lacking.

Mr. Hicks, of S. D. Hicks & Son, finds in the fact that manufacturing has been light for some time in copper and brass lines reason to look for some renewal of activity during the year just begun. "Supplies have been drawn upon," he says, "to such an extent that stock-taking probably will show the need of replacing products of many kinds."

War material contracts are not reaching Boston manufacturers, as far as can be learned, but there is an impression, nevertheless, that some parts of Massachusetts where leading industries have received this sort of stimulus will benefit from the new financial activity, and that the metal industries will share in the distribution of work that is likely to follow.

At the Boston Nickel Plating Company, as at several other plating and finishing shops, there was a little more call for output just prior to the holidays, but January witnesses a reversion to decidedly quiet times. One of the features of note, however, is the fact that just at present there is some demand for work on automobile appurtenances.

While not all the employees can be kept busy all the time in each shop in this branch of the metal industries, employers are considerate, as a rule, and distribute the work so that most of the help can be retained and given employment for three or four days, or perhaps more, per week.

Jewelers and silver platers vary in their reports as to the prospects for 1915. Prior to Christmas there was considerable holiday business, although hardly as much as ordinarily presents itself at that season. Now the shops as a rule are quieter and proprietors hardly know what to expect. They are hopeful, but that is about all that can be said. In the building trades the outlook also is indefinite, with limited current demand for interior metal furnishings, builders' hardware and electrical and gas fixtures.—J. S. B.

PROVIDENCE, R. I.

JAUNARY 11, 1915.

That there is a distinct and marked improvement in the metal industries, with the exception of the manufacturing jewelry and kindred lines, is the general opinion of those who are in close touch with the situation. It is said that the business in the metal lines is fast assuming normal proportions and the outlook for the near future is very encouraging. In fact, it is confidently expected that within the coming few weeks there will not be a plant of any size in the state that will not be running full time and to a 100 per cent. capacity. Good workers in several lines have already become scarce and there is a constant demand for machinists and other employees of metal trades plants.

War orders form a large percentage of the increased demand which has been placed upon the metal trades establishments of this vicinity, and the shortage of engine lathes, milling and grinding machines and other machine tools, together with the shortage of small tools, has sent many orders to the plants of the state. The foundries are equally busy with the makers of machinery and several are working overtime to keep abreast of the demands made upon them.

The jewelry buyers of the country have been and gone on their annual pilgrimage to Providence in quest of new goods for spring, but they have left comparatively few orders. The manufacturers are looking over the results of the buying season and find little to encourage them as to the opening of the new year. Few concerns received any very large orders while others received small aggregates. Several of the plants which have been having a fair business during the latter portion of the year have commenced to curtail.

The Metal Products Corporation, 1012 Eddy street, corner of Thurbers avenue, is preparing to make extensive improvements and alterations to the manufacturing building which it occupies and a number of pieces of additional machinery is to be installed in the several departments.

A new safety device to prevent the clothes of the operatives from becoming caught in the belts or pulleys beneath jewelry polishing benches has been placed on the market by H. J. Astle & Company, of this city. They announced that hereafter all polishing benches turned out by their concern will have the new device fitted to them. Several new Boland pressure blowers have been installed recently in jewelry factories in this vicinity by H. J. Astle & Company. These include one in the plant of H. C. Luther & Company, 227 Eddy street, this city, and one in the factory of C. A. Smith & Company at Attleboro.—W. H. M.

NEWARK, N. J.

JANUARY 11, 1915.

This has been a very slow year among the manufacturers of gold, platinum, sterling silver, German silver, brass, bronze and other metal lines. The output has been about 50 per cent. of what is considered a good year in business and many will run below that, but this condition is said not to be due in any way to the war. The war has helped matters by cutting off the imports from Europe, thereby nullifying the tariff law to a certain extent, although the export has been hurt considerably.

Owing to the growing scarcity of platinum the manufacturers are going back to the better grade of gold lines. Plated silverware has done very well. The gold, silver and bronze foundry business has been very poor, there being only three firms doing business, while a few years ago there were six or eight. The platinum, gold and silver smelters and refiners have not done on the average more than 50 to 60 per cent. of the usual business. The demand this year has been more for real staples and necessities, the luxuries not selling so well.

The Elite Novelty Company have increased their capital stock and purchased the molds of the Newcomb-Hammond Company, who formerly manufactured novelties at Wallingford, Conn.

The H. S. Wyckoff Company report that they have had good success with their new cleaning compound to remove dirt and grease before plating.—H. S.

LOUISVILLE, KY.

JANUARY 11, 1915.

Louisville coppersmiths and metal dealers report a general picking up in business during December. The month showed a very good increase over November, but business was not as good as it was during the corresponding month of last year. The year as a whole has not been quite up to 1913. This condition was largely due to the fact that Kentucky distillers were practically inactive and very little repair work was done and practically no new distilleries built. The canning industry and milk pasteurizing concerns did a good deal of work, and this branch of the trade brought business up somewhat. Collections have been fairly good. The outlook for 1915 is far better than the outlook for 1914 was, according to a number of the leading men in the trade. It is the general opinion that American manufacturers will be far busier during the coming year than ever before on account of the war in Europe and the entire trade is optimistic.

Elmore Sherman, president of the Vendome Copper & Brass Works, returned to Louisville from Louisiana to spend the holidays. The company has had several large distillery jobs in the south during the past year and Mr. Sherman has spent most of his time on the work. The plant is working eighteen hours a day and using all the men it can get hold of. Several copper workers have been brought to Louisville from Cincinnati and other points to work in the shop and on new jobs being erected. The concern has a deal on to build a large distillery in South America, but has not closed the contract so far.

W. P. Davis, a well-known metal broker of Louisville, said that a general improvement in business had been noted during December and that all lines of metal had shown an improvement. Sheet copper has advanced two cents on the pound during the past forty days, but is not firm. Pig copper has shown approximately the same increase and is in better demand than for some time past. Business is not quite normal for the season, but the outlook is excellent. Babbitt metal and lead is also in good demand.

The metal trade of Louisville is considerably interested in the activities of the North & South American Trading Company, organized for the purpose of promoting reciprocal trade relations with South American countries. The concern has been organized in part by local interests and has established headquarters in the American National Bank building in Louisville. The new company is incorporated under the laws of Delaware and its capital stock is listed at $1,000,000. The officers are Sidney Storey, of New Orleans, president; George R. Washburne, Louisville, vice-president; Stanley Bronner, Louisville, secretary, and Cordoiro DeGraca, of Rio Janeiro, Brazil, second vice-president. It is understood that the company proposes to promote trade relations between interests in Indianapolis, Cincinnati, St. Louis, Chattanooga, Nashville, Birmingham, Memphis, Louisville and contiguous territory. Its plan is to make unnecessary the sending of individual agents by each manufacturer and merchant doing a South American trade.

John M. Connell, assistant superintendent of the brass department of the Standard Sanitary Manufacturing Company, has been very ill for the past six weeks. Mr. Connell is suffering from Bright's disease and during the early part of the month physicians practically abandoned hope of his recovery. However, he has made a strong rally and is now expected to recover. Mr. Connell is forty-three years old and has been with the company for twenty-eight years.

Business with the Tennessee Copper Company's mines and plants at Ducktown, Tenn., has regained momentum which for a while was lost as a result of the war and things are again humming. The railroad company has again assigned a special locomotive and switching crew to handle the company's business. For a while the plant was practically closed down.

The E. A. Stegge Manufacturing Company, of Louisville, makes a specialty of repairing automobile lamps. Enameling, nickel plating, brass plating and repairing is handled and the company is also equipped to put in new glasses and reflectors. —G. D. C.

BUFFALO, N. Y.

JANUARY 11, 1915.

The old year closed with a fair amount of business on the local metal dealers' books, a twinkle of optomism in their eye, a sure sign of the return of prosperity.

A little boom in business during the past month has begun to re-establish confidence. The railroads' having been granted their increase in freight rates has already been felt as a stimulus for the return of prosperity in 1915. Some of the railroads have expressed their desire to expend millions for locomotives and other rolling stock, and some orders have been placed. And according to the local metal men they believe this to be one of the barometers of indication that 1915 will be a year full of prosperity for the metal dealers.

Another reason as given by local men that next year is one full of promise is because all the buyers have been buying from hand to mouth so long that their shelves have become somewhat bare. The little boom of last month has stimulated confidence, and as an ultimate result they will have to buy if they wish to get their share of business when the big boom strikes us.

All the local electroplaters are working full swing, and a few working overtime, a very hopeful outlook for the coming year. In talking with Mr. A. F. Flanders, president of the A. F. Flanders Manufacturing Company, the largest polishers and platers in Buffalo, and who do nearly a worldwide business, he said among other things, "after a tour of fifty-two cities in the middle west within the last sixty days I have returned with a large number of good sized orders. Everywhere I went," he continued, "I saw how this country was blessed with agricultural prosperity, and in seeing this, I believe that the coming year will be a great year for this country. Collections are slow, but they will be coming in faster before long, as soon as complete confidence has been established."

"With the war raging in Europe we ought to do a large volume of business with our South American neighbors this coming year," THE METAL INDUSTRY representative remarked.

"Not until we have established American branch banks," he replied. "German and English money is pouring out of those countries."

Nearly every foundry is working over 50 per cent. capacity, with the exception of the Black Rock Brass and Bronze Company, which was shut down several weeks ago for an indefinite period.

The Schnell Bronze Bearing Company, Inc., for instance are working full capacity, overtime and Sundays in order to get out their orders.

The Unique Bronze Foundry is also working full capacity. They just recived another order from the Pierce Arrow people to do all the yellow brass work casting for six hundred war trucks, while the Lumen Bearing Company received the order to do all the manganese bronze work for the same number of trucks.

The rolling and finishing end of the local metal business is holding its own. Everyone is busy, and some have booked larger orders than others. One firm booked an order from the government, its exact nature could not be learned. A fair share of the business in this end of the game is domestic, but the greater portion of it is for foreign trade. In fact some of the heads of different concerns claim they have not had such a good spell of business in months. The Buffalo Copper and Brass Rolling Mill were working about 50 per cent. capacity for months until the last month, when there was a decided change. They are now working full capacity, and with orders to keep them busy for some time to come. Another head of a large local concern said that he had never known a time at this season of the year when he reecived so many orders for new business as he has during the past two weeks.

An industrial exhibition is being planned by the local industrial leaders of this city of locally manufactured wares. The idea of this exhibit is to make Buffalo the centre of the trading and buying for western New York and northwestern Pennsylvania, to give the surrounding community an inside view as to what and how things are made in Buffalo.

Fifty men will soon be working in the new $60,000 plant of the Tuttle-Bailey Company of Canada, Ltd., located at Bridgeburg, Ont.

The Pease Manufacturing Company have increased the number of their directors from three to five; and the Pinches Dental Manufacturing Company recently filed a certificate to dissolve.—G. W. G.

TORONTO, ONTARIO, CANADA

JANUARY 11, 1915.

The shutting off of a good portion of the imports from Europe has created a situation that calls for the establishing of factories in Canada to make many lines that have heretofore never been made. Among these lines are fancy silverware, mesh bags, chemicals, many kinds of cheap jewelry, gold plated, art brass and bronze goods, etc. Of course many lines are now being supplied from American or British factories, but Canadians are demanding Canadian-made goods, so as to keep the money here and also keep the people employed.

The Aluminum Specialty Company have opened a factory in Oakville, Ont., which will be greatly enlarged, and they have opened offices in Montreal, London, Ont., Ottawa, Hamilton, and will do so in other places. A factory will also be built in Toronto and will employ 200 to 300 men.

The Dennis Wire & Iron Company, of London, Ont., are buying more property and contemplate a big extension to the plant and are making solid bronze work a specialty.

A. B. Ormsby Company are doubling the capacity of their plant for the manufacture of steel, brass and bronze doors.

The Tallman Brass & Metal Company are manufacturing a fine line of brass and bronze lighting fixtures. They manufacture the Arctic metal, which is used by the largest manufacturers of Canada. A specialty is made of brass, bronze, copper and aluminum castings, and they are also making finished brass goods. The company carries in stock 300,000 pounds of brass rod, sheet, tubing, wire, etc. The lighting fixtures are a new line, they being previously bought from the States. The company is contemplating building an addition to its plant at Hamilton, Ont.

W. H. Banfield & Sons, of 120 Adelaide street, west, are making electric lighting fixtures of brass and bronze and have also started the International Mail Equipment in Dufferin street, for which sheet metal is used.

The Ontario Art Brass Company, of 64 Richmond street, east, has taken over the fixture manufacturing department of the Faircloth Company. The plant of this company has been enlarged and the finishing department improved.—H. S.

CINCINNATI, OHIO

JANUARY 11, 1915.

Business among the various metal concerns in and around Cincinnati may be said, with a fair degree of accuracy, to vary according to the lines which are handled. For instance, a leading concern in the business of furnishing bronze and other metal goods for bank and office fixtures, name-plates, and the like, reports that the demand is about up to the normal. Another, supplying castings in various metals for other manufacturers, sees good business ahead, but admits that it has not yet arrived; while those concerns whose products are used chiefly by the distillers and brewers, this including most of the coppersmiths, are frankly pessimistic, on account of the state of the liquor industry. Thus, it is difficult to say that business is either good or bad, because a general report would be inaccurate as to one or more lines of business. It may be said without hesitation, however, that while the past year, as a whole, has been considerably below par with most branches of the trade, and while, even yet, there is no great rush of business with any of them, the feeling is remarkably optimistic, and prospects, as far as they can be judged, are of the best.

Men in the metal trades feel that they are certain to be among the beneficiaries of better business in other lines, especially among the manufacturers, and that when the railroads begin their long-delayed buying of supplies, as they are expected to do with better rates granted them, metals will be a large item in the bill. Those men of affairs and financiers who unwaveringly predict the best business in years for 1915 are given a pretty full degree of faith by the metal industry, and the trade in this section, at least, is confident that these cheering prophecies are to be largely realized before the year has progressed very far. Feeling this way, they are willing to stand to their guns in the meanwhile, even though business as yet may not be all that could be desired.

The Cincinnati Manufacturing Company, which does a considerable business in ornamental bronze, brass and other metal work in various lines, reports a very satisfactory business, especially in the north and northwest, with some good orders from the south as well. Most of the latter, however, came in some months ago, before the depression caused by the war and its effect on the cotton market, and these are being filled at this time, on contracts made then. The company states that the volume of business handled by them has been satisfactory for practically the entire year, and that indications are favorable for even better business during 1915.

The Edna Brass Manufacturing Company, according to one of its officers, has been getting a fair share of the business going around lately, but the total volume available has not been such as to make that share anything especially large. The company handles a great deal of the business of local machinery manufacturers, which, normally, is a line sufficient to keep its plant busy. For some time this work has not been up to a normal volume, but indications are growing that things are getting back to a satisfactory figure, and it is believed that before long activity will again be the rule, with corresponding benefits to the Edna Company and other concerns in the trade which are interested.

G. V. Fromme, assignee of the Acme Die & Stamping Company, of Urbana, Ohio., recently filed in court the schedule of the company's debts, which amount to $3,035.74. The assets of the company have been sold to the American Tool Manufacturing Company and others, the amount realized being $2,284.92, and the proceeds, less expenses, will be apportioned among the creditors.—K. C. C.

DETROIT, MICH.

JANUARY 11, 1915.

Every line of the metal industry is extremely quiet at the present time and no material change is expected to take place until late in the season. However, it is gratifying to state that authorities familiar with the situation, and who have followed this branch of endeavor throughout the year, state the business has hardly fallen off ten per cent. during the year just closed. Conditions have been much better in Detroit than in any other city in the country. The greatest trouble with Detroit has been the fact that its prosperity has been advertised throughout this country and Canada and the city at present is flooded with a surplus of labor, particularly unskilled. Manufacturers in the brass and aluminum business, as well as in other lines, have taken measures to correct this evil and conditions are expected to improve. The Board of Commerce is issuing what is called necessity cards to unemployed men in urgent need and these are given preference with manufacturers.

The automobile business is at a standstill, especially in the pleasure car line, and also in brass and aluminum accessories. However, there is some business being done among the truck plants; the Packard and one or two others are manufacturing for European export. None of the larger concerns are entirely idle, but all are operating under curtailed conditions.

The plumbing, steamfitting and other brass manufacturing concerns are doing but little. Manufacturers in all lines of the brass and aluminum business are optimistic in their forecasts, and believe conditions will open favorably within the next few weeks. They do not believe that manufacturers and consumers are going to be scared out by the European war, but will fall back when the spring season opens, into something like old times, although not to the extent it was just prior to the last presidential election, which, in a measure, started the ball to rolling down hill.

The Detroit Bath Tub and Brass Company within the last week filed schedule in the United States District Court showing assets of $65,646.45 and liabilities of $69,716.57 in answer to a petition filed by creditors to declare the concern a bankrupt. The firm consented to the proceedings.—F. J. H.

NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

The Winchester Repeating Arms Company, New Haven, Conn., are contemplating building a two-story, 53 x 120-foot addition to its dry kiln at a cost of $24,000.

Frederick A. Brower has been appointed New York manager of the Oswego Machine Company, Oswego, N. Y., with offices at the Singer Building, 149 Broadway, New York, N. Y.

The Ohio Brass Company, Mansfield, Ohio, has received a large order for the high tension insulators and other equipment needed in connection with the electrification of one of the divisions of the Chicago, Milwaukee & St. Paul Railroad.

A. Milne & Company, 741-745 Washington street, New York City., have opened a branch warehouse at 550 Washington Boulevard, Chicago, Ill., where they will carry a complete stock of tool steel, and hollow and solid drill steel of the well known Fjab brand.

The published report that the Canadian Lamp & Stamping Company, Walkerville, Ont., Canada, is building a one-story brick shop, 40 x 100 feet, is incorrect. This company operates a brass machine shop, plating and polishing department and stamping department.

The Ansonia Foundry Company, Ansonia, Conn., is building a new foundry for the manufacture of brass and aluminum castings which they expect to have completed by the first of March. Besides a brass and aluminum foundry this company operates a brass machine shop.

The firm of Kirschbaum & Brothers, formerly located at Newark, N. J., and which has been owned by C. J. Bates & Son, manufacturers of metal manicure goods, Chester, Conn., for several years has been moved to Chester and all future business will be carried on under the name of C. J. Bates & Son.

Work has been started by the New Jersey Zinc Company, at Palmerton, Pa., on the erection of another addition to its plant which, it is reported, will cost about a half a million dollars to construct and equip. When finished it will be devoted to the manufacture of lithopine, a valuable substance used in mixing paints.

The Everhard Manufacturing Company, manufacturers of electrical appliances, metal specialties and novelties, 524 Walnut avenue, Canton, Ohio, is planning to double its plant in order to take care of its growing business. The company was recently incorporated with $10,000 capital stock by C. H., H. H. and V. P. Everhard.

The Radio Glass Plating Company, 1890 Third avenue, near One Hundred and Fourth street, New York, of which Samuel Wein is president, announces that they are now ready to engage in the deposition of metal on any sort of non-metallic substances and also in the manufacture of selenium cells and phonograph records.

It is reported that an order for 500,000 aluminum canteens to be used by the men fighting in Europe has just been received by the Aluminum Company of America, New Kensington, Pa. Several hundred workmen have been assigned to the work of making the canteens and shipments will begin shortly. The order will keep the aluminum plant busy for several months.

In the final adjustment of the business of the Detroit Foundry Supply Company, Detroit, Mich., the department known as the platers' and polishers' department was sold to the Hill & Griffith Company, Cincinnati, Ohio, who bought the good will, valuable formulas and all of the necessary machinery, and moved to their plant at Cincinnati. The other department, known as the foundry supply department, was sold to the E. J. Woodison Company, of Detroit, Mich.

One of the most important metals used in the manufacture of ammunition was recently placed upon the contraband list by the allies. This metal was copper. An instructor at the Franklin Institute, Philadelphia, Pa., explained the vast importance of one metal to a nation in modern warfare. He said that brass, which is composed of copper alloyed with zinc, is the material used for all shells and that any nation, whose supply of copper was cut off, would be compelled to find a substitute or else discontinue fighting.

The Celluloid Zapon Company, manufacturers of lacquers, varnishes, etc., New York, N. Y., announce that its new factory at Forty-fifth and La Salle streets, Chicago, Ill., was opened for operation on January 1. The plant will be under the management of Mr. Frank P. Davis and will carry in stock a full line of lacquers and lacquer enamels as well as other goods manufactured by them. Mr. Davis will also have a line of finished samples in the office which he will be glad to show to any one interested.

The Robbins & Myers Company, manufacturers of electrical equipment Springfield, Ohio, announce that the fire which occurred in their factory on December 12 only affected the foundry and did not damage in any way the electrical plant. They also state that deliveries have not been affected as arrangements for handling foundry work have been made with adjoining manufacturers. The following are a list of different departments operated by this company: brass foundry, brass machine shop. plating and polishing department, and stamping department.

"The suit brought against the International Spray Company and John A. Georgio, by Walter J. Smart, trading under the name of the Eureka Pneumatic Spray Company, came up for trial in the Federal Court of the Southern District of New York on December 22, 1914. The patent sued on by Walter J. Smart is one granted to Barton, No. 696,158, dated March 25, 1902, for improvement in atomizing apparatus. The suit was dismissed by Judge Learned Hand for invalidity. The opinion was handed down by the court on December 28, 1914. In consequence, the controversy between the two spray companies has been determined in favor of the International Spray Company of 208 Centre street, New York, N. Y."

The H. Mueller Manufacturing Company, Ltd., of Sarnia, Ont., Canada, has been awarded a large contract for 70,000 brass pieces to be used by the Canadian government in the manufacture of shrapnel shells. This is the first government contract secured by the Canadian plant for war material and was awarded to the Mueller company in preference to a number of competitors after a thorough test of the samples furnished. This order will keep the plant busy for sixty days and the prospects are that the order will be duplicated. The Mueller company has also furnished a number of its water main tapping machines to the government at Ottawa and large quantities of water works brass goods during the past year.

A "Made in the U. S. A. Industrial Exposition," to be held at the Grand Central Palace, New York, March 6 to 13, is the latest development in the nation-wide movement to popularize and permanently establish the "Made in the U. S. A." slogan or national trade-mark and increase American industry and trade. This exposition is designed to show "American Made" and "American Grown" products in practically all branches of business, and it is held at a time of the year when New York is the mecca of mercantile buyers from every section of the United States, and this army of merchants is to be supplemented this year by a large number of South American and other foreign buyers who have heretofore gone to Europe at this same season.

The Pioneer Brass Works, of Indianapolis, Ind., report that they are getting good results from their new aluminum alloy, which has been no the market only about two months. This alloy is made of a combination of volatile salts with aluminum and the melting of the metal and thorough mixing with the salts produces an alloy having extreme strength and

malleability. It is said that this alloy shows a tensile strength of about 25 per cent. greater than the average No. 12 alloy and at the same time is free from pin holes usually seen in aluminum castings. The absence of these pin holes allows the metal to be polished more easily and also enables the makers to satisfactorily nickel plate it. Samples of this alloy are on exhibition at the office of THE METAL INDUSTRY.

S. Reubens & Brothers, of 68 Cliff street, New York, N. Y., have been appointed the general selling agents by the Crown Smelting Company of Chester, Pa., for the sale of their celebrated Crown brand of phosphor copper. This phosphor copper is made to contain either 5, 8, 10 or 15 per cent. phosphorus as required, guaranteed and free from impurities, which insures maximum deoxidizing action and absolute control over the phosphorous content in the metal treated. The Crown Smelting Company have been manufacturers of phosphor copper for twenty-five years and are said to be the largest manufacturers of this material in the world. On account of their long experience in the manufacture of phosphor copper, they are able to put on the market a very superior article at the lowest price consistent with furnishing a guaranteed product. Prices will be furnished upon request.

HUNGERFORD'S NEW BUILDING

U. T. Hungerford Brass & Copper Company are now located in their new sixteen-story fireproof building, Lafayette, Franklin and White streets, New York, lately erected specially to accommodate their large stock of "Star Brand" brass, copper, bronze, yellow metal, german silver and tobin bronze in various forms, such as sheets, tubes, rods, wire, rivets, soldering coppers, tacks, nails, etc. The Hungerford company's removal from their former quarters in Pearl street was made necessary by the acquisition of the property by the city for the proposed Court House, together with their constantly expanding business which requires a building of unusual stability and size to house their stock of brass and copper material, approximating five million pounds.

THE HUNGERFORD BUILDING.

To those who are now numbered among its patrons, as well as those who are as yet unacquainted with their full and complete line, the Hungerford company extend a cordial invitation to inspect their new home.

REMOVAL

The A. & G. Plating Company, Ltd., Detroit, Mich., manufacturers of the Allen burnishing machine, have moved their plant from 595 Beaufait avenue to 402 St. Antoine street, Detroit, Mich., where they will have larger and better quarters. They are also adding an enameling department.

BUSINESS TROUBLES

A meeting of the creditors of the William Bens Company, Providence, R. I., was held at the Providence office of the National Jewelers Board of Trade, 17 Exchange street, that city, on December 17, 1914.

The property of the Goodwin & Kintz Company, manufacturers of gas and electric fixtures, Winsted, Conn., is being offered on the market by Gilbert L. Hart, receiver for the company.

Arthur T. Rutter & Company, manufacturers of brass goods, 256 Broadway, New York City, and Ossining, N. Y., has filed a petition in bankruptcy. Liabilities, $24,855, and assets, $4,805.

FIRE

The silversmithing establishment of Thomas A. Weiss & Son, 47 Maiden Lane, New York, N. Y., was damaged by fire on January 4.

The fire which started in the plant of the Reliance Gauge Column Company, Cleveland, Ohio, on December 14 spread to the plant of the Champion Plating Works, which was completely destroyed. The Champion Plating Company have taken space in a new fireproof building at 5902-5912 Carnegie avenue, Cleveland, Ohio, where they expected to be in complete operation by January 5.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Trade News" columns.

To manufacture metal novelties, signs, toys, etc.—The Clar Lux Manufacturing Company, Buffalo, N. Y. Capital $15,000. Incorporators: Richard T. Gee, John J. Ryan, Marion C. Clement, Alice Gee and L. R. Clement.

To manufacture electric fixtures, metal shades and other specialties. A-A Electric Manufacturing Company, 355 Water street, Bridgeport, Conn. Capital $20,000. The officers are Linn B. Abbott, president; H. C. Alvord, secretary and treasurer.

To manufacture small tools.—Pfeiffer Manufacturing Company, Bedford, Mass. Capital $200,000. Incorporators: Benjamin Derby, Concord Junction, Mass.; Immanuel Pfeiffer, Jr., and Louis Pfeiffer, both of Bedford, Mass. The company's plant is equipped with a machine shop, press room and plating department.

To manufacture lighting fixtures.—Edwards Lighting Fixture Company, 65 East Lake street, Chicago, Ill., Capital, $25,000. Incorporators: Leo J. Gerorgen, John L. Cushing and L. V. Hult. Among the departments operated by this company are a brass foundry, brass machine shop, plating and polishing department and spinning department.

To manufacture brass, bronze, babbitt metal, aluminum and all kinds of alloy products.—The Alloy Foundry Company, Akron, Ohio. Capital $25,000. Officers: J. A. Reagle, president; S. C. Gresham, vice-president and W. W. Warner, secretary and treasurer. By special formulae the company will furnish products with great tensile strength or hardness, also acid proof bronze and other specialties.

FOREIGN TRADE OPPORTUNITIES

For addresses of these enquiries apply to Bureau of Foreign and Domestic Commerce, Washington, D. C., and give file number.

No. 14,814. Metals.—The Bureau of Foreign and Domestic Commerce is in receipt of a request from a foreign legation for quotations on first-class double-refined soft lead and tin (Billiton, Straits, or Banca). The prices should include the import duty, and be made c. i. f. destination. A full report of the request may be had on application to the Bureau of Foreign and Domestic Commerce or its branch offices.

No. 14,831. White-metal ware.—A consul in South America reports that he has received an inquiry for names of American manufacturers and exporters of white-metal ware. Name of inquirer is on file with the Bureau of Foreign and Domestic Commerce and its branch offices. Correspondence should be in English.

No. 14,885. Brass tubes, and materials for electric lamps, etc.—A manufacturer in Russia informs an American consular officer that he is desirous of importing brass tubes, brass sockets for electric incandescent lamps and wolfram filament for same, and scythes. Catalogues, price lists, and discount sheets are desired. Prices should be c. i. f. destination if possible. Correspondence should be in Russian or German. References will be furnished.

No. 14,911. Copper tubes, brass plugs, etc.—A firm informs an American consul that it desires catalogues and price lists from American manufacturers of tin tubes, copper tubes, brass plugs, and monometers of a pressure of two atmospheres. Correspondence should be in Portuguese.

No. 14,980. Copper wire, tin, zinc, etc.—A commission merchant in Europe informs an American consular officer that he wishes to correspond with American manufacturers of naked copper wire—electrolytic and commercial, silicium bronze wire, copper tubes and sheets, brass tubes and sheets, silver, platina, new silver, and lead wire, tin, zinc, and tinplate, dynamos, large and small electromotors, electric fans, stoves, kitchen utensils, material for electric-light installations, bells, telephones and apparatus, and all accessories for high and low current lines. Correspondence may be in English.

INQUIRIES AND OPPORTUNITIES

Under our directory of "Trade Wants" (published each month in the rear advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds, assists in the buying and selling of metals, machinery, foundry and platers' supplies, procures positions and secures capable assistants. See Want Ad. pages.

PRINTED MATTER

Portable Tools.—A complete line of portable tools, such as drills and boring and grinding machines, are given in a folder recently issued by the Stow Manufacturing Company, Binghamton, N. Y., who claim to be the oldest portable tool manufacturers in America.

Casting Metals.—The Continuous Casting Corporation of Newark, N. J., have issued a small descriptive folder of the Mellen rod machine, which is designed for the continuous production of aluminum, brass, copper and steel rod. This machine has been described in the columns of THE METAL INDUSTRY.

Calendars.—Handsome and useful calendars have been sent out for 1915 by C. G. Hussey & Company, Pittsburgh Copper and Brass Rolling Mills, Pittsburgh, Pa.; the Atkinson Company, manufacturers of brass, bronze and aluminum castings, Rochester, N. Y., and I. Shonberg, manufacturer of babbitt metals, type metals and solders, Brooklyn, N. Y.

Buffing Machinery.—The Webster & Perks Tool Company, Springfield, Ohio, have issued a series of interesting leaflets giving illustrations and specifications of the extensive line of ball-bearing polishing and buffing lathes, improved tool grinders, polishing and grinding machines, and rotary oil pumps manufactured by them. Copies of these leaflets will be sent upon request.

Electric Furnaces.—The Department of the Interior, Bureau of Mines, Washington, D. C., has issued Bulletin 77, which treats of the electric furnace, in metallurgical work. This bulletin has been published by the bureau in connection with its investigation looking to the prevention of waste and the increase of safety and efficiency. The bulletin presents a compilation of such data which seems to be useful for the information of such persons who seem to be interested in the matter.

Poddyright compound is made for holding hot metals of all kinds and is described in a little folder issued by W. R. Dempwolf, of York, Pa. Poddyright is manufactured principally to take the place of putty or clay, which is used for holding babbitt metal while pouring journal boxes, etc. Its advantage over this material is that it will not dry out under the same heat and it can be used over and over again. This material is sold under a guarantee and if it is not found to be as represented it can be returned to the dealer from whom it is purchased.

The Punch Press.—"The Punch Press" is a bright little magazine that is issued by the Globe Machine and Stamping Company, manufacturers of sheet metal boxes, tumbling barrels, reels and beams and operators of a sherardizing plant, Cleveland, Ohio. The current issue of this magazine, dated December, 1914, No. 5, in addition to the information given regarding the products of the Globe company, has also three or four articles written in a common sense manner which treat of the various subjects of the day. Copies of this magazine may be obtained upon request.

Foreman's Handbook.—James H. Rhodes & Company, New York and Chicago, Ill., dealers in electro-plating and industrial chemicals, have issued the second edition of their little book, which they call "The Foreman's Handbook." The booklet is reported to have been in great demand and has proven very interesting to electro-platers in general. The booklet contains revised information on the scientific methods of cleaning metal surfaces with the German Carlsruhe cleanser, which is produced exclusively by this company. Copies may be obtained on request.

Speed Lathe.—Particular attention is called to the new book just issued by Leiman Brothers, 62 John street, New York, illustrating and describing their bench speed lathe. This machine should be found in every tool room, jewelry and novelty shop or any sort of an experimental or machine shop, laboratory, training school, or home workshop. The machine is very accurately made, having dustproof bearings and hollow spindle. Special attention is also called to the low price at which the machine is sold, making it possible for those who have use for a fine lathe to secure one without paying the exorbitant price ordinarily demanded for a tool of this kind. Copies of this booklet will be sent upon request.

Crucibles.—This reproduction of the new cover design from a new edition of the booklet, "Dixon's Graphite Crucibles," is merely suggestive of the valuable information contained in the sixteen pages that follow. In addition to a preface and the table of crucible sizes, information is furnished of brass melting crucibles, file crucibles, crucible covers, tilting furnace crucibles, retorts, bottom-pour crucibles, stirrers, skimmers, dippers and self-skimming crucibles. Altogether this little booklet is most worth while to the man interested in the subject of better foundry practice. A copy is gratis to those who take the trouble of writing to the Joseph Dixon Crucible Company, Jersey City, N. J.

METAL MARKET REVIEW FOR 1914—OUTLOOK FOR 1915

By J. J. Archer.

REVIEW.

The year 1914 opened fairly satisfactorily as far as metals were concerned. There was a good buying movement in copper both for foreign and domestic account and the market looked good for the first three or four months. Iron and steel did not show any improvement, the railroads were not buying and the normal home business did not come along.

After the European war started and the London and New York Metal Exchanges closed the metal market was, for a time, very excited. Later the markets became normal, but business generally has been far from satisfactory. Some special lines have caught some good foreign orders. The large export orders for steel have not materialized and home demand is not even keeping pace with the ordinary wear and tear of a country half the size of the United States of America. The enormous wealth that has been thrust on this country through the most bountiful crops ever harvested, seems as nothing today in the general apathy that hangs over any initiative or enterprise in business. The Federal Reserve Bank law is to stop all cornering of funds in times of stress and panic and all business is to have the benefit of ample facilities for all legitimate business ventures. This will no doubt help to stimulate business, but so far there seems to be absolutely nothing to stimulate.

The passing of the year 1914 comes as a relief to every one in the country. One word more about the events of 1914: It is my opinion that this great United States of America had its opportunity once during the year that is closed to take its stand, where it belongs, and establish itself for all time as the leading nation of the world—as the upholder of the right, as the upholder of the sacredness of a signed treaty, as the leader of liberty, of civilization, of humanity. The opportunity was there very plain, very apparent, but the leaders of this great nation were not big enough to grasp it.

"We are neutral"!

We acquiesce! A treaty is but a "scrap of paper"—

When the history of this most barbarous war is written it cannot but be plain to all the world that this great American nation was "weighed in the balances and found wanting."

OUTLOOK FOR 1915.

Basic conditions in this country are in good shape. The railroads in the East have been granted, approximately, the 5 per cent. advance in rates, and already the roads are beginning to place orders for material. The Federal Reserve Banks are ready for business, and although there may seem to be a lot of unnecessary red tape in the way of quick action, the ultimate benefit to the merchants at large all over the country is so far-reaching that business will surely expand enormously. The sentiment of the country today is optimistic. There is to be no more heckling of big business, and there will be foreign imports, or low offers from Europe, so that manufacturers will be able to get a fair return, and prices generally are certain to be higher. The effect of the enormous crops has hardly materialized. The demand from Europe for all kinds of manufactures is growing daily and 1915 should be a banner year.

COPPER.

The year 1914 opened with electrolytic copper selling at around 14¼ cents per pound. Europe began to come into the market in January and February and price was pushed to 14¾ cents; domestic consumers bought freely when prices were on the up turn. It began to look as though the depression of 1913 was over and that business was gradually improving. The heavy exports for the first four months helped to sustain the market, but the home business did not come along and prices gradually declined to 13½ cents in June. The exports in May and June fell off about 15 million pounds from the high point in March, and this had a more or less depressing effect on domestic buyers. In July the copper market was unsettled, and at the end of the month when war was declared the price of electrolytic was close to 12¾ cents per pound. During August there was very little buying, the London Metal Exchange was closed, and prices here steadily declined until about 11 cents was reached early in November. Some producers declined to sell below 11½ cents, while another sold down to 11⅜ cents, and just before the turn for the better, towards the end of November, one of the leading producers booked orders at close to 11 cents per pound.

There has been no business day since the war started that electrolytic copper could not have been bought, it is perfectly true that for several days there were no buyers of copper and prices then were more or less nominal, but there has always been a price at which copper could be bought. To say that the machinery of business was stopped and that there was no market was absolutely false and misleading.

The Copper Producers' Association stopped the publication of the July figures, and it is uncertain whether they will renew their monthly figures.

The exports of copper are not published until thirty days after the shipments; the exports during November were 25,999 tons according to Custom House returns. The protest to Washington, against the "unwarranted" interference by England of shipments of American copper, has been made by all the foreign houses in the trade. There are several genuine American firms both producing and exporting more copper in a week than some of these protesting German firms do in a year, and yet these American firms have made no protest. Their export business has been more or less restricted on account of the high freight rates, but none of their shipments have been held up.

It seems to me ill-timed for this Government to be nagging England about a little thirty cents worth of copper, that German firms are trying to get through to Germany, when England is fighting for the cause of civilization against a despotic militarism that is a menace to the progress of the whole world. No nation on this globe is more vitally interested in this struggle for existence and freedom than this great United States of America.

To get back to the copper market. With the London Metal Exchange open and cables from there each day the copper market has become fairly normal and after the gradual decline to around 11 cents at the end of November a buying movement started, with good buying from Europe and home consumers, and prices were easily pushed up to 13½ cents per pound and the market is around that figure today.

Statistically the market is not in very good shape, the stocks on hand today must be close to 200 million pounds, but if the large producing companies continue to restrict their refinery output 50 per cent., consumption will be able to catch up with production. According to the United States Geological Survey the production of copper from domestic and foreign ores for 1914 was 1,493,000,000 pounds compared with 1,615,067,000 pounds in 1914. The exports for the year—December estimated—were 840,048,777 pounds against 926,441,142 pounds in 1913. The estimated consumption for the year may be around 570,000,000 pounds against 812,000,000 pounds in 1913. The imports for the year were close to 309,000,000 pounds—December estimated—against over 409,000,000 pounds in 1913.

The future of the copper market looks most favorable for the producers. The production last year decreased over 122,000,000 pounds during 1913. The 50 per cent. restriction of Refinery output did not have any bearing on the stocks until about November and December, and if this same restriction is kept up for another three months the stocks of copper on hand will be almost negligible. Prices today are around 13½ cents delivered for Electrolytic, 13¾ cents for Lake and 13⅛ to 13½ for casting brands, and the market looks good.

TIN.

With the exception of the month of August, the pig tin market has behaved fairly respectably. The fluctuations from month to month have not been as violent as we have sometimes had them. Opening at around 37 cents in January, 1914, prices advanced to over 40 cents in February, when prices gradually declined to close to 30 cents in June. During July the market was stronger again and prices advanced to over 32 cents. In

August, or immediately after the war started in July, the market became very excited; shipments were going to be stopped, the London Metal Exchange was closed, the New York Exchange followed suit, and all sorts of fancy prices were made. On the same day prices would fluctuate 5 cents or more per pound; overnight prices advanced 7 cents and then declined as rapidly. Sixty-five cents was paid willingly, and the market at times looked good for $1 tin. This limit was not reached, and before the end of the month shipments came along freely and the scare was over. During September the market was normal and prices were around 30 to 33 cents, and closed for the year at close to 33 cents.

LEAD.

Lead is one of the metals that has been benefited through the war. The market opened with lead at 4.15 New York. Business was very dull and the Trust reduced its price to 4.10 January 9. During February, with a better market for copper, business seemed to be picking up, and the price was advanced 5 points to 4.15, to be reduced again later in the month to 4 cents New York basis. For some months the price fluctuated 5 to 10 points nearly every month until October, when the Trust put the price down to 3.50 on the 7th. During November the price was advanced three times to 3.90 on the 19th, but on the 28th the Trust for some unaccountable reason dropped the price 10 points to 3.80, and that is the market price today New York basis.

Owing to the general mix-up in Mexico only about 20,000 tons came from that quarter against 47,847 tons in 1913. These are the figures of the U. S. Geological Survey. The exports to Europe during the year, of domestic lead, were 20,000 tons.

The London price of lead opened at £18 5s. and advanced to £20 7s. 6d. before the end of January. The London price of lead was above the New York market until quite late in the year.

Prices here were considered very unsatisfactory, but without the exports of 20,000 tons prices might have been very much less. The average price for the year was 3.90, the lowest price since 1898. The average for the year 1913 was 4.40.

The Government figures show an increase in domestic production for the year of 100,000 tons, and on this basis the stocks on hand at the end of 1914 must be about the largest on record.

SPELTER.

The European war saved the spelter producers thousands of dollars. If the stocks of spelter in Europe had not been held in Germany it is possible that 4-cent spelter would have been seen. The domestic market was very dull during the first six months of the year and the price ranged from about 5¼ down to close 4¾ cents in St. Louis.

Stocks were supposed to be steadily increasing as business dwindled, and as much as 50,000 tons was the general estimate.

With the war started in Europe, several Governments same into the market and the price was run up to over 6 cents per pound. Purchases for Europe were close to 30,000 tons. After this foreign buying prices sagged off again rapidly to below 5 cents, and later the market became fairly steady and close at about 5.70 New York and 5.55 East St. Louis.

The Government has not been able to issue any preliminary report on the production, etc., for the year, because certain foreign producers objected to the publicity. Probably another example of German Kultur.

ALUMINUM.

The aluminum market for the year shows a steady decline in price from about 26½ cents a year ago to 19¼ cents today. The average price for the year is about 18.65 against 23¾ the average for 1913.

ANTIMONY.

The antimony market was very dull during the first half of the year, but with the possible stoppage of supplies and the demand in Europe owing to the war a large speculative buying took place and prices more than doubled. Some European Governments are said to be still in the market and higher prices may yet be seen. Today Cookson's is quoted at around 15½ cents, Hallett's 14½ cents, Hungarian grade 13½ cents—against 7⅜ cents for Cookson's a year ago, 7 cents for Hallett's and 6 cents for Hungarian grade.

SILVER.

The silver market has been very weak and unsettled and some of the lowest prices on record have been made during the year. Today the market is around 48¾ cents in New York and 22⅝d. in London. The average price for the year is about 54.85 against 59.80 for 1913.

PLATINUM.

The platinum market has held fairly steady and prices have not varied much. Business has been very dull. The market is quotable today at $44 per ounce for ordinary refined and $47 for 10 per cent. hard.

QUICKSILVER.

The price of quicksilver has fluctuated considerably during the year. Opening at $38 per flask prices touched $75, and at the close the wholesale price is $50.

SHEET METALS.

Prices of manufactured copper have pretty well followed the fluctuations of the ingot market. Sheet copper opened a year ago at 20¼ cents, with Lake copper at 15⅜. Prices gradually declined to 16½ in October—the low point of the year—with Lake at 11½ cents. From that time the markets improved and prices reached 18½ in December, with Lake at 12½. Today Lake is around 13¾ cents and sheet copper is likely to be advanced. Copper wire is quoted at 14½ cents base, and high sheet brass at 13¾ cents.

OLD METALS.

The old metal market has suffered from the general depression. Prices have been unsatisfactory and foreign trading has been very much restricted and the turnover for the year has not been as favorable as it might have been.

DECEMBER MOVEMENTS IN METALS

	Highest.	Lowest.	Average.
COPPER:			
Lake	13.75	12.90	13.25
Electrolytic	13.50	12.75	13.00
Casting	13.35	12.60	12.95
TIN	34.95	32.65	33.65
LEAD	3.90	3.80	3.80
SPELTER	5.90	5.40	5.70
ANTIMONY (Hallett's)	16.00	14.00	14.75
SILVER	50.25	48.12	49.40

WATERBURY AVERAGE

The average price of Lake Copper per pound as determined monthly at Waterbury, Conn.:

1913—Average for year, 15.83. 1914—January, 14.75; February, 15.125; March, 15.00; April, 14.875; May, 14.75; June, 14.375; July, 14.125; August, 13; September, 12.875; October, 12.25; November, 12.25; December, 13.50. 1914—Average for year, 13.91.

CATALOG EXHIBIT

An exhibition of every kind of catalog may be seen at The Metal Industry office, 99 John street, New York. The Metal Industry is prepared to do all of the work necessary for the making of catalogs, pamphlets, circulars and other printed matter. Estimates will be furnished for writing descriptions, making engravings, printing, binding, for the entire job from beginning to end or any part of it.

DAILY METAL PRICES

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Market Report of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of $10. The price of the Report alone is $10. Sample copies furnished for the asking. We can furnish daily telegraphic reports of metal prices. Address THE METAL INDUSTRY, 99 John street, New York.

Pig Iron and Metal Products of the United States

Calendar Years 1905-1913. (1914 Estimated.)

(FROM THE UNITED STATES GEOLOGICAL SURVEY.)

PRODUCTS. METALLIC.	1905 Quantity.	1905 Value.	1906. Quantity.	1906. Value.	1907. Quantity.	1907. Value.	Products.
Pig iron (spot value) long tons	22,992,380	$382,450,000	25,307,191	$505,700,000	25,781,361	$529,958,000	Pig iron.
Silver, commercial value, troy ounces	56,101,600	34,221,976	56,517,900	38,256,400	56,514,400	37,299,700	Silver.
Gold, coining value, troy ounces	4,265,742	88,180,700	4,565,333	94,373,800	4,374,827	90,435,700	Gold.
Copper, value at New York City, pounds	901,907,843	139,795,716	917,805,682	177,595,888	868,996,491	173,799,300	Copper.
Lead, value at New York City, short tons	302,000	28,690,000	350,153	39,917,442	375,099	33,760,424	Lead.
Spelter, value at N. Y. City, short tons	203,849	24,054,182	199,694	24,362,668	223,745	26,401,910	Spelter.
Quicksilver, value at S. Francisco, flasks	30,451	1,103,120	26,238	958,634	21,567	828,931	Q'ksilver.
Aluminum, value at Pittsburgh, pounds	11,347,000	3,246,300	14,910,000	4,262,286	17,211,039	4,926,948	Aluminum.
Antimony, value at S. F'cisco, short tons	3,240	705,787	1,766	602,949	2,022	622,046	Antimony.
Nickel, value at Philadelphia, pounds	.....	.....	.....	.....	9,910	1,322,985	Nickel.
Tin, pounds	.....	.....	.....	35,600	.....	33,285	Tin.
Platinum, value (crude) at New York City, troy ounces	318	5,320	1,439	45,189	357	10,589	Platinum.
Total value of metallic products	.....	$702,453,101	.....	$886,110,856	.....	$903,802,244	

PRODUCTS. METALLIC.	1908. Quantity.	1908. Value.	1909. Quantity.	1909. Value.	1910. Quantity.	1910. Value.	Products.
Pig iron (spot value) long tons	15,936,018	$254,321,000	25,795,471	$419,175,000	26,674,123	$412,162,486	Pig iron.
Silver, commercial value, troy ounces	52,440,800	28,050,600	54,721,500	28,455,200	57,137,900	30,854,500	Silver.
Gold, coining value, troy ounces	4,574,340	94,560,000	4,821,701	99,673,400	4,657,018	96,269,100	Gold.
Copper, value at New York City, pounds	942,570,721	124,419,335	1,092,951,624	142,083,711	1,080,159,509	137,180,257	Copper.
Lead, value at New York City, short tons	310,762	26,104,008	363,319	31,245,434	389,211	34,250,568	Lead.
Spelter, value at N. Y. City, short tons	190,749	17,930,406	230,225	24,864,300	252,479	27,267,732	Spelter.
Quicksilver, value at S. Francisco, flasks	19,752	824,146	21,075	957,859	20,601	958,153	Q'ksilver.
Aluminum, value at Pittsburgh, pounds	11,152,000	2,434,600	34,210,000	6,575,000	(h) 47,734,000	8,955,700	Aluminum.
Antimony, value at S. F'cisco, short tons	13,629	1,264,771	12,896	1,231,019	14,069	1,338,090	Antim. L'd.
Nickel, value at Philadelphia, pounds	.....	.....	19,284,172	10,027,769	25,359,544	13,186,963	Nickel.
Tin, pounds	.....	.....	.....	4,832	.....	23,447	Tin.
Platinum, value (crude) at New York City, troy ounces	750	14,250	638	15,950	773	25,277	Platinum.
Total value of metallic products	.....	$549,923,116	.....	$764,309,474	.....	$762,472,273	

PRODUCTS. METALLIC.	1911. Quantity.	1911. Value.	1912. Quantity.	1912. Value.	1913. Quantity.	1913. Value.	Products.
Pig iron (spot value) long tons	23,257,288	$327,334,624	30,180,969	$420,563,388	30,388,935	$458,342,345	Pig iron.
Silver, commercial value, troy ounces	60,399,400	32,615,700	63,766,800	39,197,500	66,801,500	40,348,100	Silver.
Gold, coining value, troy ounces	4,687,053	96,890,000	4,520,717	93,451,500	4,299,784	88,884,400	Gold.
Copper, value at New York City, pounds	1,097,232,749	137,154,092	1,243,268,720	205,139,338	1,224,484,098	189,795,035	Copper.
Lead, value at New York City, short tons	405,863	36,527,670	415,395	37,385,550	436,430	38,405,840	Lead.
Spelter, value at N. Y. City, short tons	271,621	30,964,794	323,907	44,699,166	337,252	37,772,224	Zinc.
Quicksilver, value at S. Francisco, flasks	21,256	977,989	25,064	1,053,941	20,213	813,171	Q'ksilver.
Aluminum, value at Pittsburgh, pounds	46,125,000	8,084,000	65,607,000	11,907,000	72,379,000	13,845,000	Aluminum.
Antimonial lead, short tons	14,078	1,380,556	13,552	1,311,348	16,665	1,675,179	Antim. L'd.
Nickel, value at Philadelphia, pounds	445	127,000	.....	.....	.....	(j)	Nickel.
Tin, pounds	.....	56,635	260,000	124,800	(k)	36,970	Tin.
Platinum, value (crude) at New York City, troy ounces	940	40,890	1,005	45,778	1,034	46,530	Platinum.
Total value of metallic products	.....	$680,531	.....	$854,779,309	.....	882,980,156	

1914 ESTIMATED.

PRODUCTS. METALLIC.	Quantity.	Value. Total.	Value. Per Unit.
Pig iron, long tons†	92,823,500	(i)	(i)
Copper, pounds*	1,129,000,000	$152,400,000	$0.135
Gold, ounces, fine*	4,490,336	92,823,500	20.67
Antimonial lead, short tons	12,850	.....	.....
Lead, short tons*	511,784	39,919,152	0.039
Spelter, short tons†	360,689	(i)	(i)
Quicksilver, flasks*	16,568	811,832	49.00
Silver, ounces, fine*	67,929,700	37,225,000	0.548
Nickel, pounds†	(e) 30,067,064	(i)	(i)

(*) Figures from United States Geological Survey.
(†) Figures from Engineering and Mining Journal.
(e) Importations for 10 months only.
(i) Figures not available.
(h) Consumption 1910-1911-1912.
(j) Included under unspecified products.
(k) Small production from Alaska, South Carolina and South Dakota.

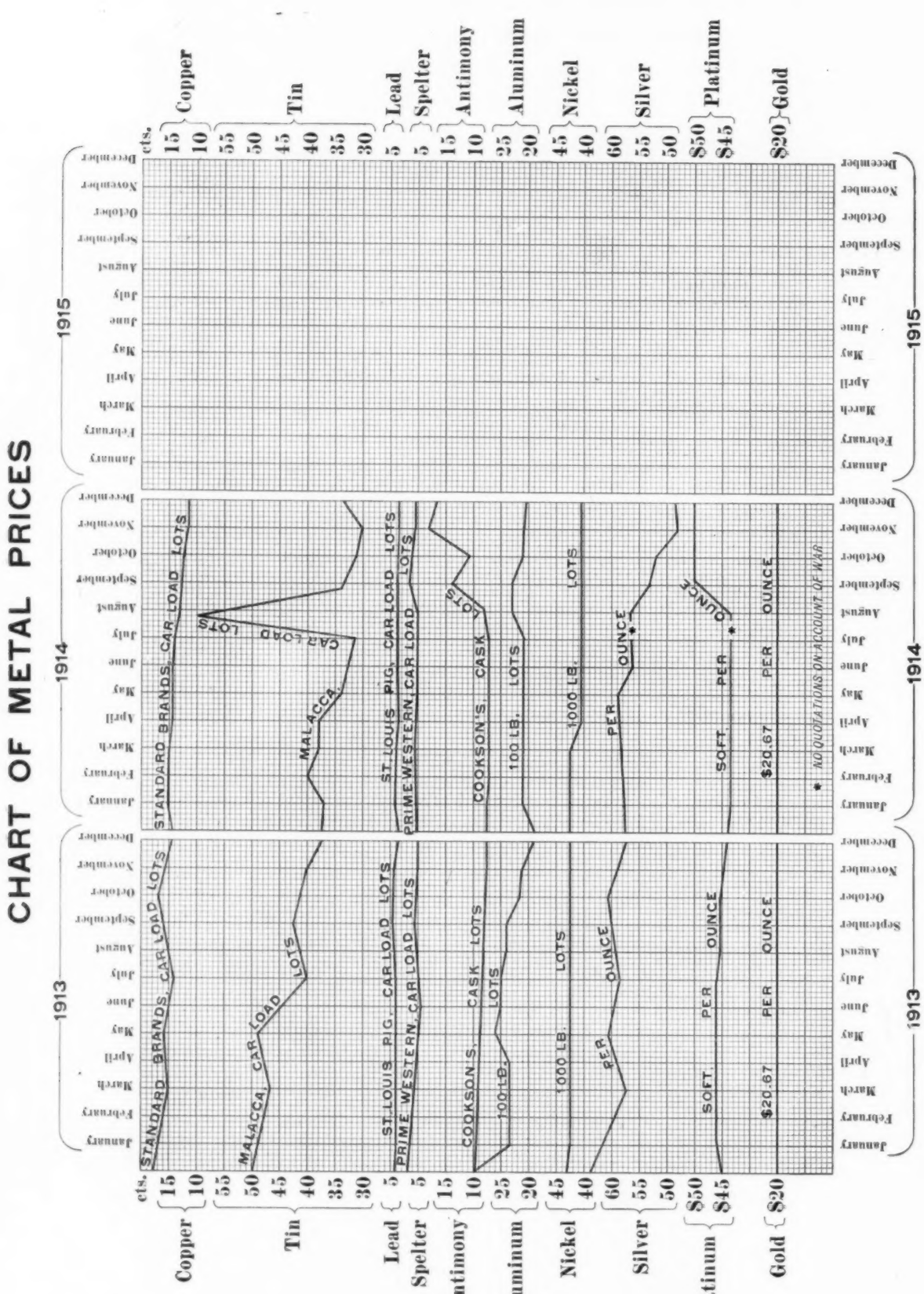


CHART OF METAL PRICES
1913
1914
1915
cts.
Copper
15
10
Tin
55
50
45
40
35
30
Lead
5
Spelter
5
Antimony
15
10
Aluminum
25
20
Nickel
45
40
Silver
60
55
50
Platinum
$50
$45
Gold
$20
STANDARD BRANDS, CAR LOAD LOTS
MALACCA, CAR LOAD LOTS
ST. LOUIS PIG, CAR LOAD LOTS
PRIME WESTERN, CAR LOAD LOTS
COOKSON'S, CASK LOTS
100 LB. LOTS
1000 LB. LOTS
PER OUNCE
SOFT, PER OUNCE
$20.67 PER OUNCE
* NO QUOTATIONS ON ACCOUNT OF WAR
January
February
March
April
May
June
July
August
September
October
November
December

Metal Prices, January 11, 1915

NEW METALS.

	Price per lb. Cents.
COPPER—PIG AND INGOT AND OLD COPPER. Duty Free. Manufactured 5 per centum.	
Lake, carload lots, nominal	13.75
Electrolytic, carload lots	13.35
Castings, carload lots	13.25
TIN—Duty Free.	
Straits of Malacca, carload lots	33.35
LEAD—Duty Pig, Bars and Old, 25%; pipe and sheets, 20%. Pig lead, carload lots	3.80
SPELTER—Duty 15%. Sheets, 15%.	
Western, carload lots	5.90
ALUMINUM—Duty Crude, 2c. per lb. Plates, sheets, bars and rods, 3½c. per lb.	
Small lots, f. o. b. factory	24.00
100 lb. lots, f. o. b. factory	21.00
Ton lots, f. o. b. factory	19.00
ANTIMONY—Duty free.	
Cookson's cask lots, nominal	16.50
Hallett's cask lots	15.00
Hungarian grade	13.50
NICKEL—Duty Ingot, 10%. Sheet, strip and wire 20% ad. valorem.	
Shot, Plaquettes, Ingots. Blocks according to quantity	.38 to .43
ELECTROLYTIC—3 cents per pound extra.	
MANGANESE METAL	.95
MAGNESIUM METAL.—Duty 25% ad valorem (100 lb. lots)	2.50
BISMUTH—Duty free	3.00
CADMIUM—Duty free	2.00
CHROMIUM METAL—Duty free	.75
COBALT—97% pure	2.00
QUICKSILVER—Duty 10%, per flask	$50.00-$54.00
	Price per oz.
GOLD—Duty free	$20.67
PLATINUM—Duty free	46.00
SILVER—Government assay bars—Duty free	48¾c.

INGOT METALS.

	Price per lb. Cents.
Silicon Copper, 10% ..... according to quantity	25 to 28
Silicon Copper, 20% ..... " "	28 to 32
Silicon Copper, 30% guaranteed " "	30 to 34
Phosphor Copper, guaranteed 10% "	23 to 27
Phosphor Copper, guaranteed 15% "	18 to 22
Manganese Copper, 25% ..... " "	25 to 29
Phosphor Tin, guaranteed 5%. " "	57 to 60
Phosphor Tin, no guarantee.. " "	39 to 42
Brass Ingot, Yellow ..... " "	10⅜ to 11⅞
Brass Ingot, Red ..... " "	11½ to 12½
Bronze Ingot ..... " "	13 to 14
Manganese Bronze Ingots .... " "	17 to 18½
Phosphor Bronze ..... " "	18 to 20
Casting Aluminum Alloys .... " "	16 to 18

PHOSPHORUS—Duty free.	
According to quantity	30 to 35

OLD METALS.

Dealers' Buying Prices. Cents per lb.		Dealers' Selling Prices. Cents per lb.
11.00 to 11.25	Heavy Cut Copper	12.25 to 12.50
10.50 to 10.75	Copper Wire	11.75 to 12.00
9.50 to 9.75	Light Copper	10.75 to 11.00
10.00 to 10.25	Heavy Mach. Comp	11.00 to 11.25
7.75 to 8.00	Heavy Brass	8.75 to 9.00
5.75 to 6.00	Light Brass	6.75 to 7.00
7.50 to 7.75	No. 1 Yellow Brass Turnings	8.25 to 8.50
8.50 to 9.00	No. 1 Comp. Turnings	9.50 to 10.00
3.35 to ——	Heavy Lead	—— to 3.60
3.75 to ——	Zinc Scrap	—— to 4.00
5.50 to 6.50	Scrap Aluminum Turnings	6.00 to 7.00
11.50 to 12.00	Scrap Aluminum, cast alloyed	12.00 to 13.00
13.00 to 14.00	Scrap Aluminum, sheet (new)	13.00 to 14.00
23.00 to 24.00	No. 1 Pewter	25.00 to 26.00
17.00 to 23.00	Old Nickel	17.00 to 23.00

PRICES OF SHEET COPPER.

BASE PRICE, 18½ Cents per Lb. Net.

SIZE OF SHEETS. Width.	LENGTH.	64 oz. and over.	32 oz. to 64 oz.	24 oz. up to 32 oz.	16 oz. up to 24 oz.	15 oz.	14 oz.	13 oz.	12 oz.	11 oz.
		Extras in Cents per Pound for Sizes and Weights Other than Base.								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	½	1	1½	2	2½
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	½	1	2	3	4½
	Longer than 96 inches. Not longer than 120 inches.	"	"	½	1	2	3	5	7	—
	Longer than 120 ins.	"	"	1	1½	—	—	—	—	—
Wider than 30 ins. but not wider than 36 inches.	Not longer than 72 inches.	"	"	Base	Base	1	2	3	4	6
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	2	4	6	8
	Longer than 96 inches. Not longer than 120 inches.	"	"	1	2	3	4	—	—	—
	Longer than 120 inches.	"	1	2	3	—	—	—	—	—
Wider than 36 ins. but not wider than 48 inches.	Not longer than 72 inches.	"	Base	1	2	3	4	6	8	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	4	5	7	9	—
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	6	9	—	—	—
	Longer than 120 inches.	"	1	3	6	—	—	—	—	—
Wider than 48 ins. but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	5	7	9	11	—
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	7	10	—	—	—
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6	—	—	—	—	—
	Longer than 120 inches.	1	2	4	8	—	—	—	—	—
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8	—	—	—	—	—
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10	—	—	—	—	—
	Longer than 120 inches.	1	3	8	—	—	—	—	—	—
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 inches.	1	3	6	—	—	—	—	—	—
	Longer than 96 inches. Not longer than 120 inches.	2	4	7	—	—	—	—	—	—
	Longer than 120 inches.	3	5	9	—	—	—	—	—	—
Wider than 108 ins., but not wider than 120 ins.	Not longer than 120 inches.	4	6	—	—	—	—	—	—	—

The longest dimension in any sheet shall be considered at its length.

CIRCLES, 8 IN. DIAMETER AND LARGER, SEGMENTS AND PATTERN SHEETS, advance per pound over prices of Sheet Copper required to cut them from ..... 3c.

CIRCLES LESS THAN 8 IN. DIAMETER, advance per pound over prices of Sheet Copper required to cut them from ..... 5c.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot and heavier, advance per pound over foregoing prices ..... 1c.

COLD OR HARD ROLLED COPPER, lighter than 14 oz. per square foot, advance per pound over foregoing prices ..... 2c.

COLD ROLLED ANNEALED COPPER, the same price as Cold Rolled Copper.

ALL POLISHED COPPER, 20 in. wide and under, advance per square foot over the price of Cold Rolled Copper ..... 1c.

ALL POLISHED COPPER, over 20 in. wide, advance per square foot over the price of Cold Rolled Copper ..... 2c.

For Polishing both sides, double the above price.

The Polishing extra for Circles and Segments to be charged on the full size of the sheet from which they are cut.

COLD ROLLER COPPER, prepared suitable for polishing, same prices and extras as Polished Copper.

ALL PLANISHED COPPER, advance per square foot over the prices for Polished Copper ..... 1c.

ZINC— Duty, sheet, 15%.

	Cents per lb.
Carload lots, standard sizes and gauges, at mill	8.75 basis, less 8%
Open casks, jobbers' prices	9c.
Casks, jobbers' prices	9½c.

Metal Prices, January 11, 1915

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect December 22, 1914, and until further notice.

To customers who buy over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.13¾	$0.15⅝	$0.16½
Wire	.13½	.15⅝	.16½
Rod	.13½	.16¼	.17½
Brazed tubing	.17½	—	.20¾
Open seam tubing	.17½	—	.20¾
Angles and channels	.17½	—	.20¾

50% discount from all extras as shown in Brass Manufacturers' Price List.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass.... ½c. per lb. net advance
" —Best spring, drawing and spinning brass.... 1½c. " " " "
Wire—Extra spring and brazing wire..... ½c. " " " "
" —Best spring and brazing wire..... 1c. " " " "

To customers who buy 5,000 lbs. or less per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.15	$0.16⅝	$0.17⅝
Wire	.14⅜	.16⅝	.17⅜
Rod	.14⅜	.17⅜	.18⅜
Brazed tubing	.18⅜	—	.22
Open seam tubing	.18⅜	—	.22
Angles and channels	.18¾	—	.22

Net extra as shown in Brass Manufacturers' Price List.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass.... ½c. per lb. net advance
" —Best spring, drawing and spinning brass..... 1½c. " " " "
Wire—Extra spring and brazing wire..... ½c. " " " "
" —Best spring and brazing wire ..... 1c. " " " "

BARE COPPER WIRE—CARLOAD LOTS.

14½c. per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order .....18½c. per lb. base
100 lbs. to 300 lbs. in one order.....19c. " " "
Less than 100 lbs. in one order.....20½c. " " "

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 3½ O. D. Nos. 4 to 13 Stubs' Gauge, 16c. per lb.
Seamless Copper Tubing, 20c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron pipe sizes with price per pound.

⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
24	23	18	17	16	16	16	16	16	16	16	17	18	20	22	23

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet Brass.	Bronze.
⅜ inch	$8	$9
½ inch	8	9
⅝ inch	10	11
¾ inch	12	13
⅞ inch	14	15
1 inch	18	20
1⅛ inch	22	24
1¼ inch	25	27
1½ inch	32	35
1¾ inch	45	48
2 inch	56	69

Discount 55-5%.

PRICE FOR TOBIN BRONZE AND MUNTZ METAL.

Tobin Bronze Rod .....17c. net base
Muntz or Yellow Metal Sheathing (14" x 48").....14c. " "
" " " " Rectangular sheets other than Sheathing.16½c. " "
" " " " Rod .....14c. " "
Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bar in the rough, 23c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Sheet Block Tin—18" wide or less. No. 26 B. & S. Gauge or thicker. 100 lbs. or more 5c. over Pig Tin. 50 to 100 lbs. 6c. over, 25 to 50 lbs. 8c. over, less than 25 lbs. 10c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more 4c. over Pig Tin. 50 to 100 lbs. 5c. over, 25 to 50 lbs. 7c. over, less 25 lbs. 9c. over.

Above prices f. o. b. mill.

Prices on wider or thinner metal on request.

PRICE SHEET FOR SHEET ALUMINUM—B. & S. Gauge.

Gauge.	Width. Inches.	1 ton.	50 to 2,000 lbs.	Less than 50 lbs.
20 and heavier	3-30	25.9	26c.	29c.
	3-30	26.9	27c.	30c.
21 to 24 inclusive	30-48	28.9	29c.	32c.
	48-60	31.9	32c.	35c.
25 to 26	3-30	27.9	28c.	31c.
	30-48	29.9	30c.	33c.
27	3-30	28.9	29c.	32c.
	30-48	31.9	32c.	35c.
28	3-30	29.9	30c.	33c.
	30-48	32.9	33c.	36c.
29	3-30	30.9	31c.	34c.
	30-48	34.9	35c.	38c.
30	3-30	31.9	32c.	35c.

The above prices refer to lengths between 2 and 8 feet. Prices furnished by the manufacturers for wider and narrower sheet. No charge for boxing. F. O. B. Mill.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.
Outside Diameters. **BASE PRICE, 22 Cents per Pound.**

Stubs' Gauge.	Inches.	¼ in.	5-16 in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1¼ in.	1½ in.	1⅝ in.	2 in.	2½ ins.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.	..	..	..	..	..	..	..	26	23	..	..	13	11	9	8	15	22
12.	.109.	..	..	..	..	..	..	..	25	..	..	..	14	..	..	..	..	..
14.	.083.	..	..	..	..	..	..	..	..	..	..	..	16	..	..	..	..	..
16.	.065.	..	..	..	..	..	27	26	26	23	22	20	20	20	20	26	30	56
18.	.049.	..	..	..	..	32	29	28	27	24	25	25	25	..	..	..	..	..
20.	.035.	116	..	45	38	33	32	31	29	28	29	29	29	30	37	48	57	80
21.	.032.	..	..	..	39	..	..	..	..	..	..	..	..	..	..	..	..	..
22.	.028.	137	97	47	41	37	36	34	33	..	..	44	..	..	..	..	..	..
24.	.022.	187	132	107	87	78	72	61	59	65	..	..	..	..	..	..	..	..

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Price per lb. over 25 lbs., Diameter, B. & S. Gauge, No. 000 to 10 and 12, 26 cents. No. 12 to 20 inch, 28 cents.

BASE PRICE GRADE "B" GERMAN SILVER SHEET METAL.

Quality.	Net per lb.	Quality.	Net per lb.
5%	18¼c.	16%	22¾c.
8%	20c.	18%	23¼c.
10%	20½c.	20%	25½c.
12%	21½c.	25%	33⅜c.
15%	22½c.	30%	39¼c.

GERMAN SILVER WIRE.

Quality.	Net per lb.	Quality.	Net per lb.
5%	19¼c.	15%	26½c.
8%	21c.	16%	27½c.
10%	22½c.	18%	29¼c.
12%	24½c.	30%	45¼c.

The above Base Prices are subject to additions for extras as per lists printed in Brass Manufacturers' Price List and from such extras 50% discount will be allowed. The above base prices and discounts are named only to wholesale buyers who purchase in good quantities. Prices on small lots are considerably higher.

PRICES OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quantity and market conditions. No fixed quotations can be given, as prices range from 1c. below to 4c. above the price of bullion.

Rolled silver anodes .999 fine are quoted at 2½c. to 3½c. above the price of bullion.